LONDON-WEST MIDLANDS ENVIRONMENTAL STATEMENT

Volume 5 | Technical Appendices

Route-wide appendix (WR-001-000)

Water resources

November 2013

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Department for Transport

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1 Introduction

1.1 Structure of the water resources and flood risk assessment appendices

1.1.1 The water resources and flood risk assessment appendices comprise three main parts. The first of these is a route-wide appendix (i.e. this appendix).

1.1.2 Specific appendices for each community forum area (CFA) are also provided:

- a water resources assessment; and
- a flood risk assessment (FRA).

1.1.3 For some CFA, additional appendices give details of site specific hydraulic models that were created to assist the FRA.

1.1.4 Maps referred to throughout the water resources and flood risk assessment appendices are contained in the Volume 5, Water Resources and Flood Risk Assessment Map Book.

1.2 Purpose of this appendix

1.2.1 This appendix reports on assessments that have been carried out on a route-wide basis. These include:

- the risk that an accidental spillage could cause a significant pollution effect;
- compliance of the Proposed Scheme with the objectives of the Water Framework Directive (WFD) 2000/60/EC[1]; and
- a route-wide FRA.

1.2.2 This appendix also includes a draft operation and maintenance plan for water resources and flood risk.

1.3 Stakeholder engagement

1.3.1 Frequent and detailed discussions were held with the Environment Agency during the preparation of the Environmental Statement (ES). These discussions ensured that issues raised by the Environment Agency were addressed during the environmental impact assessment (EIA) and, where considered appropriate, their suggestions were incorporated in the ES.

1.4 Generic assessments on a route-wide basis

1.4.1 Technical notes giving guidance on the generic methods to be adopted in the assessment of the following specific items are included in the SMR (see Volume 5: Appendix CT-001-000/1) and the SMR Addendum (see Volume 5: Appendix CT-001-000/2), and include:

[1] Water Framework Directive - Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, Strasbourg, European Parliament and European Council.

- surface water quality;
- groundwater; and
- spillage risk.

1.4.2 These technical notes have ensured a consistent approach to the assessment of the Proposed Scheme and give guidance on assessment methods for which no recognised guidance exists. They are not intended to provide an exhaustive or prescriptive methodology, and where a different method was used in a particular CFA, this is stated in the report for that study area.

1.5 Spillage risk

1.5.1 The risk that a polluting spillage may result from an accident has been assessed on a route-wide basis, as the risk is not considered to be affected significantly by site specific parameters.

1.5.2 The risk of a spillage causing a significant effect on water resources will depend on the probability of an accident and the consequence of any spilt pollutant affecting a receptor. An accident will not necessarily lead to a spillage of pollutant, and even if it does, such a spillage will not always lead to pollution of a water body.

1.5.3 The probability of a rail accident causing a pollution incident is low, and on the Proposed Scheme, where electric passenger trains will operate, is considered extremely low.

1.5.4 The Environment Agency reported in its latest Pollution Incidents Report (September 2013)[2] that of all pollution incidents recorded in 2012, 1% were caused by the transport sector. No further analysis is given for type of transport mode, or what proportion of the 617 significant incidents were caused by the transport sector. However it is reasonable to assume that at most only a handful of significant pollution incidents in England and Wales were caused by railway operations.

1.5.5 Spillage of diesel from those locomotives and spillage of freight are two major potential causes of pollution from railway operations. For the Proposed Scheme, where electric locomotives will be used and passenger trains operated, these two risks will be significantly reduced.

1.5.6 No pollution incidents have been reported on the similar HS1 route since it began operation.

1.5.7 In the unlikely event that a spillage takes place, it may be absorbed by the ballast and drainage systems. Ballast, where it is present, tends to adsorb heavy hydrocarbons and considerably reduces the volume of their discharge to the receptor. The drainage network on the Proposed Scheme will include sustainable drainage systems, such as balancing ponds and swales, which will also retain a significant proportion of pollutants.

1.5.8 Spillages may not occur at a location where a pathway to a sensitive receptor exists, for example where track drainage discharges to a sewer. Prompt action by the

[2] Environment Agency (2013), *Pollution Incidents 2012*.

emergency and environmental services may prevent the pollutant affecting the receptor; for example by shutting valves, blocking outfalls, or deploying oil booms. Measures will be incorporated into the design of the drainage system to facilitate the deployment of such systems to limit the extent of pollution. These factors will further reduce the risk of accidental pollution.

1.5.9 Spillage could also occur in depots and stations during operation and maintenance work, although application of the draft operation and maintenance plan for water resources and flood risk will mitigate those spillage risks.

1.5.10 Although the risk of a pollution incident will be affected by site specific parameters, as a receptor such as a Site of Special Scientific Interest (SSSI) will usually be particularly sensitive, these were not considered significant enough to warrant site specific spillage assessments being carried out in each CFA, as the generic risk is considered to be very low. The only exception to this relates to the risk from spillages on highways, and for this risk, site specific assessments were carried out, where appropriate, in each study area and are discussed within the relevant CFA reports (Volume 2, Section 13) and the water resources assessment appendices (WR-002) in Volume 5.

1.5.11 There are not likely to be any significant regional or route-wide adverse effects on water resources as a result of accidental spillages during the operation and maintenance of the Proposed Scheme.

1.6 In combination effects

1.6.1 In combination effects are defined as those that result from a combination of a number of individual effects. There are not likely to be any significant route-wide adverse in-combination effects affecting water resources and flood risk.

1.7 Monitoring

1.7.1 Specific monitoring to determine the potential impact to groundwater bodies will be undertaken in locations where the assessment predicts that a likely significant adverse effect may occur. The monitoring schedule (to be agreed with the Environment Agency and in consultation with any affected stakeholders) will include monitoring before, during and after construction until the groundwater quality has stabilised within acceptable limits. The monitoring data will be assessed and used to define appropriate mitigation, should it be required.

1.8 Climate change effects

1.8.1 Current projections to the 2080s indicate that climate change may affect the future baseline against which the impacts of the Proposed Scheme on surface water and groundwater resources have been assessed. There may be changes in the flow and water quality characteristics of surface water and groundwater bodies as a result of changes in climate. However, except for flood flows described below, these changes are not considered to result in significant changes to the reported effects from the Proposed Scheme.

1.8.2 Current projections indicate that there will be more frequent, higher intensity rainfall events in the future. The probability and severity of surface water flooding could therefore increase as surface water drainage systems fail to cope with more frequent,

higher intensity storms. Peak river flows during flood events are expected to increase, potentially causing greater depths and extents of flooding.

1.8.3 When considering the influence that climate change may have on the future baseline, against which the impacts from the Proposed Scheme on flood risk have been evaluated, the assessment has used the recommended precautionary sensitivity ranges of key parameters, as given in Table 5 in the technical guidance to the NPPF[3]. The sensitivity testing undertaken allows for variations in climate change factors included in other national guidance.

1.8.4 Further information on the potential additional impacts of climate change for water resources and flood risk is provided in Volume 1 and Table 13 of Volume 5: Appendix CT-009-000.

[3] Department for Communities and Local Government (2012), *Technical Guidance to the National Planning Policy Framework*.

2 Water Framework Directive compliance assessment

2.1 Introduction

Overview of the Water Framework Directive

2.1.1 The WFD aims to protect and enhance the quality of the water environment across all European Union (EU) member states. It takes a holistic approach to the sustainable management of water by considering the interactions between surface water, groundwater and water-dependent ecosystems.

2.1.2 Under the WFD, 'water bodies' are the basic management units and are defined as all or part of a river system or aquifer. These water bodies form part of a larger 'river basin district' (RBD), for which 'river basin management plans' (RBMP) are developed by EU member states and environmental objectives are set. These RBMP are produced every six years, in accordance with the river basin management planning cycle.

2.1.3 The most recent RBMP were produced in 2009. The next plans are due in 2015.

2.1.4 The WFD requires all EU member states to classify the current condition or 'status or potential' of surface water and groundwater bodies and to set a series of objectives for maintaining or improving conditions so that water bodies maintain or reach 'good status or potential'.

WFD requirements for new developments

2.1.5 To ensure compliance with the WFD, decision makers, must consider whether proposals for new developments have the potential to:

- cause a deterioration of a water body from its current status or potential; and/or
- prevent future attainment of good status or potential where not already achieved.

2.1.6 The Environment Agency is generally responsible for implementation of the WFD in England. The Environment Agency is a key stakeholder for the Proposed Scheme as discussed in Section 1.3 of this appendix.

Scope of works

2.1.7 The Proposed Scheme will cross a large number of surface water bodies and groundwater bodies; therefore an assessment of the Proposed Scheme's compliance against the WFD objectives of the potentially affected water bodies is required.

2.1.8 This report summarises the assessment approach, mitigation and results with respect to compliance with WFD objectives. It follows the screening stage in which water bodies potentially affected by the Proposed Scheme were identified and discussed with the Environment Agency.

2.1.9 The WFD assessment should be read in conjunction with the following:

- Volume 2, CFA reports, Section 7, Ecology;
- Volume 2, CFA reports, Section 13, Water resources and flood risk assessment;
- Volume 5: Appendices WR-002 Water resources assessment reports; and
- Volume 5: Water Resources and Flood Risk Assessment Map Book.

2.1.10 The Proposed Scheme design, environmental setting and impact assessment is described in these volumes and used as the basis of this WFD assessment.

2.1.11 The WFD assessment has been undertaken at the water body scale.

2.1.12 However, water bodies can span several CFA so do not fit readily within CFA boundaries. Throughout the report, the relevant CFA are cross-referenced.

2.1.13 The WFD assessment is based on the Proposed Scheme design, incorporated mitigation measures and on the current status of water bodies.

Assumptions and limitations

2.1.14 The WFD classification data presented in Volume 2 and Volume 5: Appendices WR-002 is taken from the Environment Agency River Basin Management Plan annexes, which are based on 2009 data. These classifications are the formal baseline against which the Environment Agency will assess compliance with the no deterioration objective in 2015. The data shown on the Volume 5, WR-03 maps series use the Environment Agency status reported in February 2013. The baseline used in this document is based on the Environment Agency status reported in February 2013. This is considered to provide the current best estimate of status in 2015.

2.1.15 Limitations with respect to baseline information have been identified, for example with respect to hydromorphology. This is discussed further in Section 2.4 of this appendix. Where baseline data is limited, professional judgement has been used in the assessment and a precautionary approach taken.

2.1.16 The WFD assessments take into account the embedded mitigation within the design and assume that the mitigation measures described in the Volume 5 CFA reports will be adopted. The assumptions presented in Volume 1 also apply to this assessment.

2.2 Assessing status

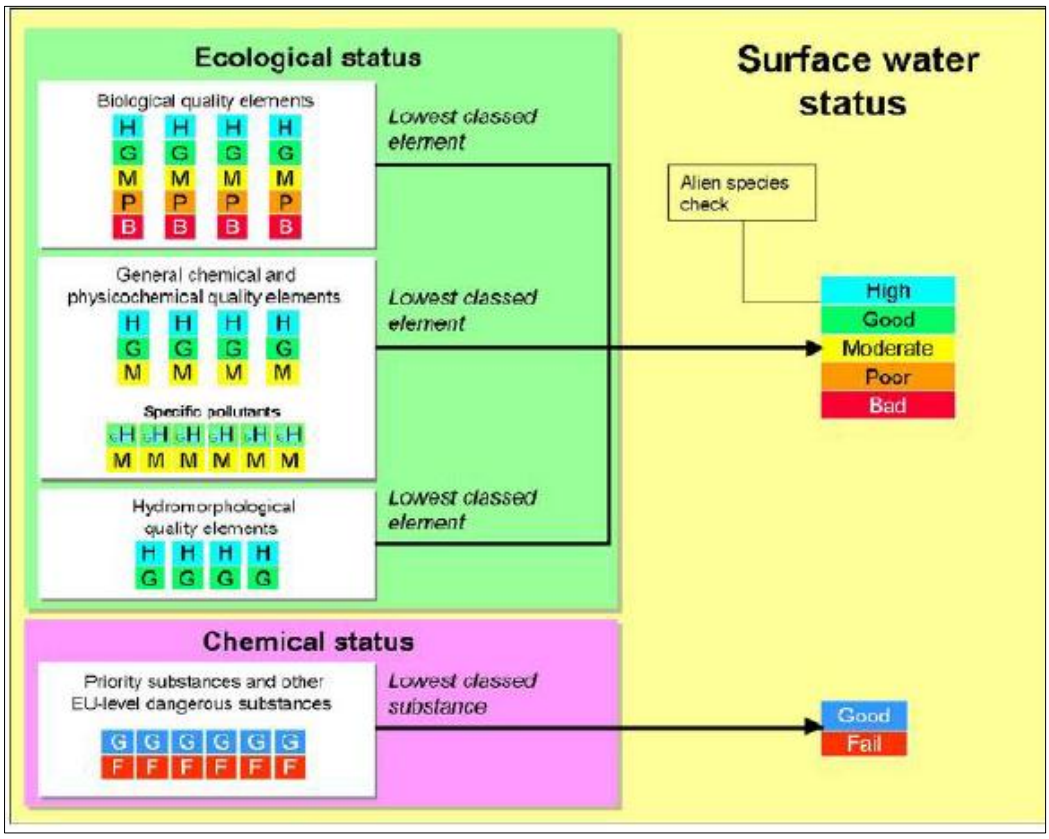
Surface water body status

2.2.1 Under the WFD, surface water body status is classified on the basis of chemical and ecological status or potential. Ecological status is assigned to surface water bodies that are natural and considered by the Environment Agency not to have been significantly modified for anthropogenic purposes.

2.2.2 Ecological potential is assigned to artificial water bodies (such as canals), or natural water bodies which, as a result of physical alterations by human activity, are substantially changed in character. They are termed Heavily Modified Water Bodies (HMWB). The term 'ecological potential' is used as it may be impossible to achieve good ecological status because of modification for a specific use, such as navigation or flood protection. The ecological potential represents the degree to which the quality of the water body approaches the maximum it could achieve.

2.2.3 The worst case classification is assigned as the overall surface water body status, in a 'one-out all-out' system. This system is summarised in Figure 1.

Figure 1: WFD classification elements for surface water body status



Source: Environment Agency Method Statement for the Classification of Surface Water Bodies (2012 Classification)

Ecological status or potential

2.2.4 Ecological status or potential is defined by the overall quality of the structure and functioning of aquatic ecosystems associated with surface waters, i.e. the condition of the watercourse. This is assigned on a scale of high, good, moderate, poor or bad, and on the basis of four classification elements or 'tests' (Environment Agency (2013) WFD Classification method statement 2012, Version 3.0) [4], as follows:

- Biological
  - This test is designed to assess the status indicated by a biological quality element such as the abundance of fish, invertebrates or algae and by the presence of invasive species. The biological quality elements can influence an overall water body status from bad through to high.
- Physico-chemical
  - This test is designed to assess compliance with environmental standards for supporting physico-chemical conditions, such as dissolved oxygen, phosphorus and ammonia. The physico-chemical elements can only influence an overall water body status from moderate through to high.

[4] Environment Agency (2013) *WFD Classification method statement 2012, Version 3.0.*

- Specific pollutants
  - This test is designed to assess compliance with environmental standards for concentrations of specific pollutants, such as zinc, cypermethrin or arsenic. As with the physico-chemical test, the specific pollutant assessment can only influence an overall water body status from moderate through to High.
- Hydromorphology
  - For natural, non-HMWB, this test[5] is undertaken by the Environment Agency during classification when the biological and physico-chemical tests indicate that a water body may be of high status. It specifically assesses elements such as water flow, sediment composition and movement, continuity, and structure of the habitat against reference or 'largely undisturbed' conditions. If the hydromorphological elements do not support high status, then the status of the water body is limited to good overall status.
  - For artificial or HMWB, hydromorphological elements are assessed initially to determine which of the biological and physico-chemical elements should be used in the classification of ecological potential.
  - In all cases, assessment of baseline hydromorphological conditions are an important factor in determining possible reasons for classifying biological and physico-chemical elements of a water body as less than good, and hence in determining what mitigation measures may be required to address these failing water bodies.

Chemical status

2.2.5 Chemical status is defined by compliance with environmental standards for chemicals that are priority substances and/or priority hazardous substances, in accordance with the Environmental Quality Standards Directive (2008/105/EC)[6]. This is assigned on a scale of good or fail.

2.2.6 Surface water bodies are only monitored for priority substances where there are known discharges of these pollutants; otherwise surface water bodies are reported as being at good chemical status.

Groundwater body status

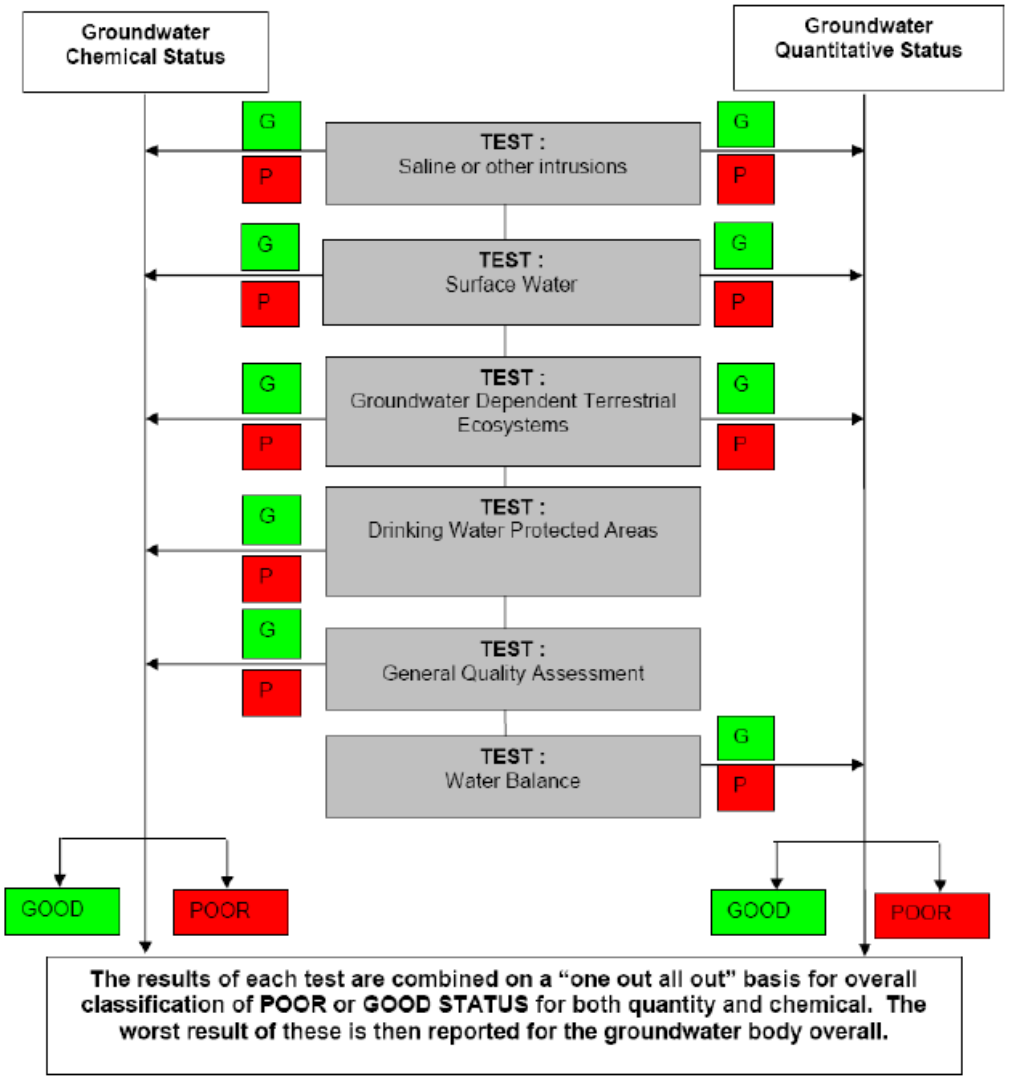
2.2.7 Under the WFD, groundwater body status is classified on the basis of quantitative and chemical status. The groundwater bodies are separated into Groundwater Management Units (GWMU) and Water Resource Management Units (WRMU). GWMU are sub-divisions of the groundwater to aid the resource assessment process. WRMU are sub-divisions according to the water resource availability and the management of water.

2.2.8 Status is assessed primarily using data collected from the Environment Agency monitoring network; therefore the scale of assessment means that groundwater

[5] Environment Agency (2013) *WFD Classification method statement 2012 (version 3.0)*.
[6] Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards in the field of water policy, Strasbourg, European Parliament and European Council.

status is mainly influenced by larger scale effects such as significant abstraction or widespread/ diffuse pollution. The worst case classification is assigned as the overall groundwater body status, in a 'one-out all-out' system. This system is summarised below in Figure 2 and the tests described in the following.

Figure 2: WFD classification elements for groundwater body status



Source: Environment Agency Groundwater Quantitative Status Assessment (Classification) Method Statement

Quantitative status

2.2.9 Quantitative status is defined by the quantity of groundwater available as base flow to watercourses and water-dependent ecosystems and as 'resource' available for use as drinking water and other consumptive purposes.

2.2.10 Quantitative status is assigned on a scale of good or poor, and on the basis of four classification elements or 'tests' as follows:

- Saline or other intrusions
  - This test is designed to identify groundwater bodies where the intrusion of poor quality water, such as saline water or water of different chemical composition, as a result of groundwater abstraction is leading to sustained upward trends in pollutant

concentrations or significant impact on one or more groundwater abstractions.

- Surface water
  - This test is designed to identify groundwater bodies where groundwater abstraction is leading to a significant diminution of the ecological status of associated surface water bodies.
- Groundwater dependent terrestrial ecosystems (GWDTE)
  - This test is designed to identify groundwater bodies where groundwater abstraction is leading to significant damage[7] to associated GWDTE.
- Water balance
  - This test is designed to identify groundwater bodies where groundwater abstraction exceeds the 'available groundwater resource', defined as the rate of overall recharge to the groundwater body itself less the rate of flow required to meet the ecological needs of associated surface water bodies and GWDTE.

Chemical status

2.2.11 Chemical status is defined by the concentrations of a range of key pollutants, by the quality of groundwater feeding into watercourses and water-dependent ecosystems and by the quality of groundwater available for drinking water purposes. This is assigned on a scale of good or poor, and on the basis of five classification elements or 'tests', as follows:

- Saline or other intrusions
  - This test is designed to identify groundwater bodies where the intrusion of poor quality water, such as saline water or water of different chemical composition, as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.
- Surface water
  - This test is designed to identify groundwater bodies where groundwater is leading to a significant diminution of the chemical status of associated surface water bodies.
- GWDTE
  - This test is designed to identify groundwater bodies where groundwater is leading to significant damage[8] to associated GWDTE.
- Drinking Water Protected Areas (DrWPA)
  - This test is designed to identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future. The aim is no deterioration in quality of waters for human consumption.

[7] As described in Environment Agency Method Statement for Groundwater Quantitative Status Assessment (Classification).
[8] As described in Environment Agency Method Statement for Groundwater Chemical Status Assessment (Classification).

- General quality assessment
  - This test is designed to identify groundwater bodies where widespread deterioration[9] in quality has or will compromise the strategic use of groundwater. The aim is no significant impairment of human use of groundwater and no significant environmental risk from pollutants across a groundwater body.

2.3 Approach to WFD Assessment

Overview and consultation

2.3.1 There is no established methodology or published Environment Agency guidance for assessing compliance with WFD objectives. This assessment has been based on internal Environment Agency guidance[10], the prior experience of team members in WFD assessments and professional judgement.

2.3.2 Workshops were held with the Environment Agency to agree the scope and approach to the WFD assessment. HS2 Ltd will continue to work with the Environment Agency through the detailed design.

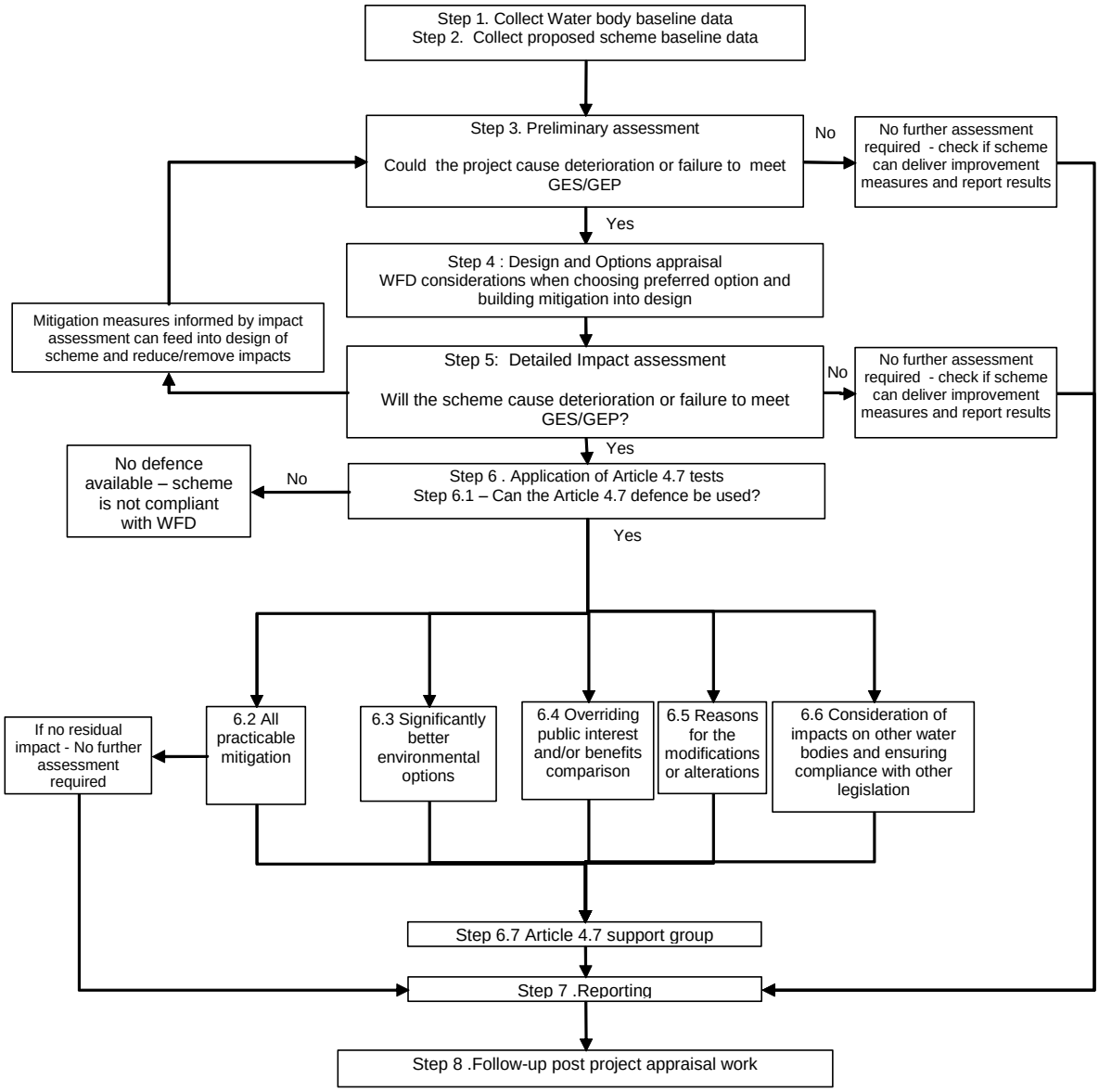
2.3.3 The WFD assessment has been undertaken as a stepped process, which can be summarised in the following steps:

1. Collect baseline water body baseline data;
2. Collect Proposed Scheme baseline data
3. Preliminary assessment
4. Design options appraisal and selection of preferred option
5. Detailed impact assessment
6. Application of Article 4.7[11] where applicable
7. Reporting
8. Follow-up post-project appraisal work

2.3.4 This process is illustrated in Figure 3.

[9] As described in Environment Agency Method Statement for Groundwater Chemical Status Assessment (Classification).
[10] Environment Agency (2010) *Assessing new modifications for compliance with WFD: detailed supplementary guidance*.
[11] Article 4.7 of Directive 2000/60/EC.

Figure 3: Steps in the WFD assessment process



Detailed assessment

2.3.5 Steps 1 to 4 of the assessment were undertaken at the screening stage. The following sections describe the approach to Step 5, the detailed assessment for surface water and groundwater bodies. It describes the spatial, temporal and technical scope of the assessment, including the water bodies considered within the assessment (Table 1 and Table 2).

2.3.6 The scheme elements of the Proposed Scheme that are considered within the assessment and the range of potential impacts and effects that may arise during construction and operation as a result of these scheme elements are presented in Table 3 and Table 4.

Spatial and temporal scope

Spatial scope

2.3.7 The spatial scope of the surface water assessment includes:

- all WFD designated and non WFD designated water bodies lying wholly or partially within the Proposed Scheme's footprint; and
- water bodies immediately adjacent to the Proposed Scheme boundary which may be affected by it. For water bodies within the Proposed Scheme footprint, an additional distance of 1km up and downstream of the Proposed Scheme boundary was considered. This was extended or reduced depending on the sensitivity of the water body and the nature of the impacts upon it.

2.3.8 The assessment of impacts on fish also included WFD and non WFD water bodies which are upstream tributaries of water bodies which lie within the Proposed Scheme boundary. This is in recognition of the migratory habit of fish populations and the potential presence of spawning habitats in the tributaries of directly affected water bodies.

2.3.9 The surface water and groundwater bodies included in the assessment are presented in Tables 1 and 2 respectively. The 60 surface water bodies are distributed across eight river basin catchments, the London Basin, Colne, Thame and South Chilterns, Cherwell, Upper and Bedford Ouse, Warwickshire Avon, Tame Anker and Mease, and Staffordshire Trent. There is one or more surface water body in every CFA as indicated in Table 1.

Table 1: Surface water bodies

Surface water body name	Water body ID	CFA	Catchment
Grand Union Canal, Uxbridge to Hanwell Locks, Slough Arm, Paddington Arm	GB70610078	1, 2, 3, 4, 5	N/A
Brent (below Silk stream down to the Thames)	GB106039023590	4, 5	London
Crane (including part of the Yeading Brook)	GB106039023030	5	London
Yeading Brook (East Arm)	GB106039023050	5, 6	London
Yeading Brook (West Arm)	GB106039023060	5, 6	London
Pinn	GB106039023070	5, 6	Colne
Grand Union Canal, Maple Lodge to Uxbridge (Rivers Colne and Chess plus canal sections)	GB70610252	7	N/A
Colne and Grand Union Canal (from confluence with Chess to Ash)	GB106039023090	7	Colne
Misbourne	GB106039029830	7, 8, 9	Colne
Bear Brook and Wendover Brook	GB106039030380	10	Thame and South Chilterns
Stoke Brook Aylesbury	GB106039030320	10, 11	Thame and South Chilterns
Bear Brook, Hartwell Ditch, at west Aylesbury	GB106039030350	11	Thame and South Chilterns
Thame (Aylesbury to Scotsgrove Brook)	GB106039030370	11	Thame and South Chilterns
Fleet Marston Brook, Denham Brook, Pitchcott Brook west	GB106039030420	11, 12	Thame and South Chilterns

Surface water body name	Water body ID	CFA	Catchment
Tetchwick Brook, Source to Ray and tributaries	GB106039030070	12	Cherwell
Ray and tributaries Northeast of Grendon Underwood	GB106039030100	12	Cherwell
Ludgershall Brook and Muswellhill Brook	GB106039030060	12	Cherwell
Twin	GB105033030560	13	Upper and Bedford Ouse
Padbury Brook (The Twins)	GB105033038210	13, 14	Upper and Bedford Ouse
Ouse	GB105033037860	13, 14	Upper and Bedford Ouse
Ouse	GB105033037880	14	Upper and Bedford Ouse
Ouse (Beds)	GB105033037950	15	Upper and Bedford Ouse
Radstone Brook	GB105033037940	14, 15	Upper and Bedford Ouse
Helmdon Brook	GB105033038230	15	Upper and Bedford Ouse
Farthinghoe Stream (Source to Cherwell) and tributaries	GB106039037290	15	Cherwell
Cherwell (Ashby Brook to Cropredy)	GB106039037350	15	Cherwell
Cherwell (Cropredy to Nell Bridge)	GB1060339037310	15	Cherwell
Clayton and Wormleighton Brook, Source to Highfurlong Brook	GB106039037370	15	Cherwell
Highfurlong Brook (Source to Wormleighton Brook)	GB106039042660	15	Cherwell
Highfurlong Brook (Wormleighton to Cherwell)	GB106039037330	15	Cherwell
Boddington Feeder (Oxford Canal)	GB806100002	15	N/A
Oxford Canal, summit pound	GB70910196	16	N/A
River Itchen - source to confluence with River Stowe	GB109054044070	16	Warwickshire Avon
River Itchen – confluence with River Stowe to confluence with River Leam	GB109054044110	16	Warwickshire Avon
Grand Union Canal, Braunston to Leamington Spa	GB70910511	16, 17	N/A
River Leam - confluence with River Itchen to confluence with River Avon	GB109054044140	17	Warwickshire Avon
River Avon (Warks) – confluence with River Sowe to confluence with River Leam	GB109054043840	17, 18	Warwickshire Avon
River Avon – Claycoton Yelvertoft Brook to confluence with River Sowe	GB109054043920	18	Warwickshire Avon
River Sowe - confluence with Smite Brook to confluence with River Avon	GB109054044540	18	Warwickshire Avon
Finham Brook – confluence with Canley Brook to confluence with River Sowe	GB109054044480	18	Warwickshire Avon
Canley Brook - source to confluence with Finham Brook	GB109054044520	18	Warwickshire Avon
River Blythe from Temple Balsall Brook to Patrick Bridge	GB104028042571	23	Tame Anker and Mease
River Blythe from Patrick Bridge to River Tame	GB104028042572	23, 24	Tame Anker and Mease
River Cole from Hatchford- Kingshurst Brook to River Blythe	GB104028042420	19	Tame Anker and Mease

Surface water body name	Water body ID	CFA	Catchment
River Tame from Confluence of the two arms to River Blythe	GB104028046840	19, 20, 25, 26	Tame Anker and Mease
River Tame from River Blythe to River Anker	GB104028046440	20	Tame Anker and Mease
Plants Brook Catchment (tributary of Tame)	GB104028046860	25	Tame Anker and Mease
River Rea from Bourn Brook to River Tame	GB104028042550	26	Tame Anker and Mease
Birmingham & Fazeley Canal upper section	GB70410515	20	N/A
Middleton Hall Catch - tributary of Langley Brook	GB104028046850	20, 21	Tame Anker and Mease
Langley Brook from Source to Middleton Hall Catch	GB104028046890	20	Tame Anker and Mease
Langley Brook from Middleton Hall Catch to River Tame	GB104028046900	20, 21	Tame Anker and Mease
Black-Bourne Brook from source (confluence) to River Tame	GB104028047000	21	Tame Anker and Mease
East Litchfield catchment - tributary of Tame	GB104028047020	22	Tame Anker and Mease
River Tame from River Anker to River Trent	GB104028047050	22	Tame Anker and Mease
Coventry and Ashby Canals	GB70910212	22	N/A
Pyford Brook Catchment (tributary of Trent)	GB104028047250	22	Staffordshire Trent Valley
Bourne-Bilson Brook Catchment (trib utary of Trent)	GB104028047270	22	Staffordshire Trent Valley
River Trent from Moreton Brook to River Tame	GB104028047290	22	Staffordshire Trent Valley
Trent & Mersey Canal, summit to Alrewas	GB70410142	22	N/A

2.3.10 There are 15 groundwater bodies crossed by the Proposed Scheme as listed in Table 2. In the London area, CFA 1 to 4 do not have groundwater bodies associated with them. Although CFA5 intersects the Lower Thames Gravel groundwater body, it is 2km from the Proposed Scheme at its closest point so has not been assessed. CFA 6, 11, 12 and 13 are all partly within groundwater bodies and partly in areas not designated as groundwater bodies.

2.3.11 The Environment Agency defined groundwater bodies at surface in the 2009 RBMP. There are some areas where, for example, a tunnel is in the Chalk (a Principal aquifer) but it is not within a designated groundwater body because there is Unproductive Strata at surface. The effects of the Proposed Scheme on groundwater in these areas (CFA 1 to 5 and large proportions of CFA 6, 11, 12 and 13) are covered in the ES. Potential impacts in these areas are assumed not to affect the WFD status of groundwater. However, where scheme elements are close to the demarcation of a groundwater body at surface, edge effects at depth below 'Unproductive Strata' are considered.

Table 2: Groundwater bodies

Groundwater body name	Water body ID	CFA	River Basin District
Radlett Tertiaries	GB40602G602800	5, 6, 7, 8	Thames
Mid-Chilterns Chalk	GB40601G601200	7, 8, 9, 10	Thames
Chiltern Chalk Scarp	GB40601G604100	10, 11	Thames
Headington Corallian	GB40602G600700	11, 12	Thames
Upper Bedford Ouse Oolite Principal 1	GB40501G402300	13, 14, 15	Anglian
Upper Bedford Ouse Oolite Secondary	GB40502G401300	13, 14, 15	Anglian
Byfield Jurassic	GB40602G604200	15	Thames
Banbury Jurassic	GB40602G600200	15, 16	Thames
Warwickshire Avon - Secondary Mudrocks	GB40902G990900	16, 17, 18	Severn
Warwickshire Avon - PT Sandstone Warwick/Avon Confined	GB40901G300700	17, 18	Severn
Warwickshire Avon - Coal Measures Coventry	GB40902G302200	17, 18, 23	Severn
Tame Anker & Mease - PT Sandstone Nuneaton & Meriden	GB40401G302700	23	Humber
Tame Anker Mease - Secondary Combined	GB40402G990800	19, 20, 21, 22, 23, 24, 25, 26	Humber
Tame Anker Mease - PT Sandstone Birmingham Lichfield	GB40401G301000	21, 22, 26	Humber
Staffordshire Trent Valley - Mercia Mudstone East & Coal Measures	GB40402G300300	22	Humber

Temporal scope

2.3.12 Water Framework Directive (WFD) classification data in Volume 2 and Volume 5: Appendix WR-002 is taken from the Environment Agency River Basin Management Plan annexes. These classifications are the formal baseline against which the Environment Agency will assess compliance with the no deterioration objective in 2015.

2.3.13 The assessment against the no deterioration objective was based on current water body status, as provided by the Environment Agency in 2013, which is considered to be the current best estimate of status in 2015.

2.3.14 The assessment also used the existing baseline data collected for the Environmental Statement in 2012 and 2013.

2.3.15 The construction timescale is expected to span across two RBMP cycles (six yearly, beginning 2015). The assessment against the prevention of obtaining the future good status objective was therefore based on the objectives set for the next RBMP cycle in 2015, whereby water bodies must achieve good ecological status or good ecological potential by 2021 or 2027.

2.3.16 Temporary impacts are not considered to result in deterioration in WFD status. Impacts are not considered to constitute deterioration of status if the water body if it:

- is only impacted for a short time period;
- recovers within a short time period; and/or
- recovers without the need for any restoration measures.

Technical scope

Surface water

Biological

2.3.17 Diatoms have been scoped out of this assessment on the basis that status for this quality element is influenced primarily by nutrient inputs. Since the Proposed Scheme will not give rise to any changes in nutrient status, no impacts on this quality element are anticipated. The assessment considered the impacts of the Proposed Scheme on the remaining three quality elements.

Physico-chemical

2.3.18 The pH sub-element was scoped out on the basis that substances affecting pH and acid neutralising capacity (ANC) are released from urban and agricultural land use, and industrial and domestic release to sewers. No proposed scheme element is likely to contribute to releases of these substances. The ammonia sub-element has also been scoped out on the basis that the Proposed Scheme will not give rise to any changes in nutrient status, with the only exception where sediment re-suspension is likely.

Hydromorphology

2.3.19 No hydromorphological sub-elements have been scoped out.

Groundwater

Chemical status

2.3.20 No chemical sub-elements have been scoped out.

2.3.21 Articles 4 and 17 of the WFD include requirements to implement measures necessary to prevent or limit the input of pollutants into groundwater and to prevent the deterioration of the status of all bodies of groundwater. The Groundwater Directive (2006/118/EC)[12] complements the Water Framework Directive (WFD) and includes a requirement for measures to prevent or limit inputs of pollutants into groundwater so that WFD environmental objectives can be achieved.

2.3.22 Many of the embedded mitigation measures incorporated into the design are aligned to the 'prevent and limit' objective. For example, the track-bed will be sealed from the surrounding sub-grade with an impermeable membrane in areas where there is a need to prevent contamination of sensitive groundwater resources by run-off from track drainage. In addition, many of the mitigation measures in the draft CoCP are aligned

[12] Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration.

with the prevent and limit objective. In so far as is reasonably practicable, the good working practices detailed in the EA's Pollution Prevention Guidelines will be adopted. Compliance with the prevent and limit objective has not been explicitly assessed as part of the water body status assessment. However, the prevent and limit objective has been taken into account during the assessment of the General Quality Assessment WFD element, which considers the potential impacts of the Proposed Scheme on groundwater quality as a whole.

Quantitative status

2.3.23 No quantitative sub-elements have been scoped out.

Scheme elements

2.3.24 The assessment included all scheme elements, temporary and permanent, which have the potential to affect surface water and groundwater bodies, and therefore have the potential to impact on WFD status. Scheme elements have either been assessed as individual elements or as a combination (e.g. river diverted and straightened into a culvert). The scheme elements assessed include:

- bored tunnels (including tunnel portals);
- green tunnels (including tunnel portals);
- viaducts (either with footings in the watercourse or riparian/marginal habitat);
- clear span bridges (footings located a significant distance from the watercourse);
- culverts (includes all design types);
- siphons;
- river diversions;
- cuttings;
- retaining walls;
- embankments; and
- stations

2.3.25 The range of direct impacts associated with the scheme elements was established during the screening stage and are summarised, together with their relevance to each scheme element in Table 3 for surface waters and Table 4 for groundwater. The impact of other structures (such as earth bunds, material storage areas, temporary haulage routes) on water bodies within or adjacent to the route are also considered.

2.3.26 The assessment takes into account both the positive benefits of 'embedded mitigation' (i.e. measures such as habitat compensation/offsetting that have been incorporated into the design of the Proposed Scheme), as well as the potentially negative impacts of the scheme elements. Positive benefits for biological and hydromorphological quality elements will arise primarily from river diversions, which will be designed to include a range of channel and bankside habitats, including pools, riffles, runs and marginal berms. Habitat enhancements will be incorporated into the

design at most culvert locations in order to provide refuges areas for fish, both up and downstream of the culverts.

2.3.27 Cumulative impacts include:

- the interaction of a range of different impacts acting upon a single quality element within a water body;
- multiple scheme elements on a single water body resulting in additive impacts on one or more quality element; and
- effects likely to be transmitted downstream to a different WFD designated water body which may or may not be directly affected by the Proposed Scheme.

Table 3: Identified impacts of scheme elements on surface water bodies

Impact considered	Bored tunnel	Green tunnel	Viaduct	Clear span bridge	Bridge with footings in water body	Culvert	Siphon	River diversion	Cutting	Retaining walls	Embankment	Stations
Footprint	✓	✓	✓	X	✓	✓	✓	✓	X	✓	✓	✓
Changes in flow velocity and volume due to de-watering	✓	✓	X	X	X	X	X	X	✓	✓	X	X
Noise and vibration during construction	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Shading	X	X	✓	✓	✓	✓	X	X	X	X	✓	X
Drainage	X	✓	✓	✓	✓	✓	✓	X	X	X	✓	✓
Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	X	X	✓	X	✓	✓	✓	✓	X	X	X	X
Change in water quality due to discharge of groundwater to a surface water body	✓	✓	X	X	X	X	X	X	✓	✓	X	X
Creation of new habitats	X	X	X	X	X	X	X	✓	X	X	X	X
Settlement of ground leading to enhancement of fractures and increased vertical permeability where applicable	✓	X	X	X	X	X	X	X	X	X	X	X

Table 4: Identified impacts of scheme elements on groundwater bodies

Impact considered	At grade	Embankment	Cutting	Retaining walls	Stations	Bored tunnel	Green tunnel	Viaduct foundations
Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTE or groundwater abstractions by temporary dewatering/permanent groundwater control	X	X	✓	✓	✓	✓	✓	X
Disturbing or mobilising existing poor quality groundwater by temporary dewatering or depressurisation and permanent groundwater control	X	X	✓	✓	✓	✓	✓	X
"Damming" of groundwater flow and reduction in groundwater contributions	X	X	✓	✓	✓	✓	✓	✓
Creating or altering of pathways along which existing poor quality groundwater can migrate	X	X	✓	✓	✓	✓	✓	✓

Biological effects

2.3.28 Effects on biological sub elements are considered in terms of likely change in composition and abundance of phytobenthos and macroinvertebrate communities and for fish on composition, abundance and age structure.

Physico-chemical effects

2.3.29 Effects on physico-chemical sub-elements are considered in relation to likely changes in the chemical composition of phosphate, ammonia and specific pollutants and for physical changes which cause variations in dissolved oxygen and temperature within a water body.

Hydromorphological effects

2.3.30 Effects on hydromorphological sub-elements are considered in relation to quantity and dynamics of flow, river continuity (including existing restrictions such as sluices), river depth and width variation, structure and substrate and structure of the riparian zone. Water bodies where a significant hydromorphological impact is anticipated will be identified.

Groundwater effects

2.3.31 Effects on quantitative sub-elements will be considered in terms of the likely changes in groundwater levels, groundwater flows and the hydraulic regime, spring flows and rates of baseflow to surface waters.

2.3.32 Effects on chemical sub-elements will be considered in terms of the likely changes in water quality.

Impact assessment

No deterioration assessment

2.3.33 The approach to the assessment against the 'no deterioration' objective broadly follows the standard ecological impact assessment method of considering the value (in this case WFD status), and sensitivity (i.e. to the impact) of the receptor, with the magnitude of the impact. The outcome is a decision on whether there will be an effect on status for the quality element in question.

2.3.34 The Environment Agency provides guidance on the definition of no deterioration (EA, 2013 (a), EA, 2013 (b)). Necessary measures must be taken to prevent deterioration from one status class to a lower one. Within-class deterioration is not a breach of the Water Framework Directive no deterioration requirements. Where the water body is already in the lowest status class (e.g. bad or fail) no significant further deterioration is permitted.

2.3.35 The matrix presented in Table 5 has been used to assign water bodies into colour-coded categories according to potential effect on status class. It ranges from a major beneficial effect i.e. a positive change in overall WFD status (dark blue) through no effect to deterioration in overall status class (red). The colour codes, summarised in Table 5, are applied in the assessment worksheets for each water body.

2.3.36 The amber category (potential adverse effect – prolonged or widespread) has been further subdivided in the final assessment for the water body as a whole to reflect the

fact that there is residual uncertainty over the level of effect that may occur. The uncertainty relates either to the level of baseline data available at the time the assessment was undertaken, or the likely response of individual receptors/quality elements to impacts from the cumulative impacts of a number of scheme elements. The two subcategories are defined as follows:

- there is uncertainty whether status change will occur as a result of insufficient baseline data, or uncertainty over the response of a receptor but there is considered to be a higher risk that status change will occur; or
- there is considered to be lower risk that status change will occur.

2.3.37 Impacts have been considered both individually and in combination in order to arrive at the conclusions regarding possible changes in status class.

Prevention of future ecological status objective assessment

2.3.38 River Basin Management Plans (RBMP) outline the pressures and the actions that will address them for each river basin district. The current RBMP are approaching the end of the first six year planning cycle, with the next planning cycle due to begin in 2015.

2.3.39 The WFD sets out in Article 4 the default environmental objectives, two of which are targeted at raising the future status of surface waters. These are;

- aim to achieve good ecological and good surface water chemical status in water bodies by 2015; and
- for water bodies that are designated as artificial or heavily modified, aim to achieve good ecological potential by 2015.

2.3.40 Where a water body is deemed unlikely to achieve either of these objectives, an alternative objective has been provided, along with justification as to why an alternative objective has been set.

2.3.41 The Proposed Scheme has been assessed against the measures defined for each water body. The assessment considers whether the development of the Proposed Scheme would prevent the defined measures from being implemented effectively.

2.3.42 Where the RBMP measures refer to proposed future changes in regulation, research and development projects and awareness-raising campaigns, it has been assumed that such measures are insensitive to impact by the Proposed Scheme.

Presentation of assessments

Surface water body assessments

2.3.43 The assessment for each surface water body is presented in Annex A. WFD quality elements are listed in the left hand column, with scheme elements presented across the top of the matrix. A summary of the available engineering design information relating to each scheme element is presented beneath the name of the scheme element to allow the reader to understand the basis for the assessment. Individual impacts arising from each scheme element are grouped into a set of columns under the scheme element.

2.3.44 Scheme elements affecting the main water body are dealt with first on the left hand side of the matrix, with scheme elements affecting tributaries towards the right hand side. Any cumulative effects with other water bodies are also included. The overall assessment for each quality element is presented towards the right hand side of the matrix. A further column, containing hydromorphological baseline information is presented on the extreme right hand side of the workbook, since no baseline data is available within the ES.

2.3.45 An assessment of the effects of the scheme element is presented for each of the quality elements. At the end of the row, an assessment is made of the cumulative effects of the Proposed Scheme on the status/potential of that WFD quality element. Decisions regarding the cumulative effects on status are based on the approach presented in Table 5.

2.3.46 Where a designated Heavily Modified or Artificial Water body has associated RBMP mitigation measures, an assessment has also been carried out for each mitigation measure proposed, whether it is 'In Place' or 'Not In Place', for the water body as a whole. The impacts on RBMP mitigation measures have been summarised in the prevention of future ecological status assessment.

2.3.47 The prevention of future ecological status assessment is assessed taking into account the Environment Agency reasons for failure and programme of measures in the RBMP.

Table 5: Decision matrix for assessing effect on surface water status class

Type of effect	Effect of scheme element on WFD element i.e. in individual cells	Effect on WFD element i.e. at end of row	Effect on WFD water body i.e. the combined effect on the water body as a result of all the effects on WFD elements	Examples	Outcome
Major beneficial	Impacts when taken on their own have the potential to lead to significant improvement.	Impacts in combination with others have the potential to lead to the improvement in the class of a WFD element.	Impacts in combination with others have the potential to lead to the improvement in the WFD status of the water body.	Creation of significant areas riparian habitats (for example, within a river diversion) which enhance the value of the water body.	Increase in status class for that water body.
Minor /localised beneficial	Impacts when taken on their own have the potential to lead to a minor localised or temporary improvement.	Impacts in combination with others have the potential to lead to a minor localised or temporary improvement of the WFD element.	Impacts in combination with others have the potential to lead to a minor localised or temporary improvement that does not affect the overall WFD status of the water body.	Minor habitat creation measures such as creation of marginal berms up/downstream of a structure.	Localised improvement, no change in status of WFD water body.
Green (no impact)	No measurable change to any quality elements.	No measurable change to any quality elements.	No measurable change to any quality elements.	Macrophytes Clear span bridge which causes light shading. Invertebrates Changes to flow with no likely effect in macroinvertebrate community/contamination in area with highly tolerant invertebrate community (e.g. ASPT <4). Fish Minor, temporary encroachment.	No change

Type of effect	Effect of scheme element on WFD element i.e. in individual cells	Effect on WFD element i.e. at end of row	Effect on WFD water body i.e. the combined effect on the water body as a result of all the effects on WFD elements	Examples	Outcome
Yellow - Localised/ temporary adverse effect	Impacts when taken on their own have the potential to lead to a minor localised or temporary effect.	Impacts in combination with others have the potential to lead to a minor localised or temporary effect on the WFD elements. Consideration will be given to habitat creation measures.	Impacts in combination with others have the potential to lead to a minor localised or temporary effect that does not affect the overall WFD status of the water body. Consideration will be given to habitat creation measures.	Macrophytes/phytoplankton Loss of macrophytes/diatoms due to shading from a bridge or other structure. Temporary loss of invertebrates/macrophytes etc. during channel re-alignment. Invertebrates Estimated loss in diversity of invertebrates for e.g. < 100 m of water body/or X% of water body surface (due to habitat loss, changes to flow etc.). Fish Localised loss of fish habitat/numbers of fish.	No change in status of WFD water body when balanced against mitigation measures embedded in the scheme.

Type of effect	Effect of scheme element on WFD element i.e. in individual cells	Effect on WFD element i.e. at end of row	Effect on WFD water body i.e. the combined effect on the water body as a result of all the effects on WFD elements	Examples	Outcome
Amber -adverse widespread or prolonged effect	Impacts when taken on their own have the potential to lead to a widespread or prolonged effect. Consideration will be given to habitat creation measures.	Impacts in combination with others have the potential to have an adverse effect on the WFD element. Additional mitigation measures will be applied.	Impacts in combination with others have the potential to have an adverse effect on the WFD water body. The current WFD risk category will be taken into account when assessing these combined impacts. Consideration will be given to habitat creation measures.	Macrophytes/phytoplankton Loss of macrophytes/diatoms for a significant length of water due to shading from a long (e.g. > 200 m) culvert or other similar structure. Invertebrates Likely significant drop in invertebrate diversity over e.g. > 300 m or X% of water body surface (due to habitat loss/siltation or combination of various impacts etc.). Fish Obstruction to upstream migration of fish to spawning grounds in a salmonid river therefore affecting fish in whole of WFD water body.	Adverse effect but risk of status change needs to be considered with any additional mitigation measures, and taking into account the level of confidence. There are two sub-categories: 1) There is uncertainty as a result of baseline data limitations but there is considered to be a higher risk that status change will occur; or 2) There is considered to be a lower risk that status change will occur.
Red – adverse effect on overall WFD status of water body	Impacts when taken on their own have the potential to lead to a widespread or prolonged effect even with mitigation in place.	Impacts in combination with others have the potential to have an adverse effect on the WFD element and change its class. Consideration will be given to habitat creation measures.	Impacts in combination with others have the potential to have an adverse effect on the WFD water body and change its status. The current WFD risk category will be taken into account when assessing these combined impacts. Consideration will be given to habitat creation measures.	Any change in status of an element that leads to an overall deterioration of WFD status of water body – this colour is only assigned when the positive benefits from mitigation for that water body are outweighed by negative impacts.	Decrease in status of WFD water body when balanced against additional mitigation measures. Outcome is considered to be certain.

Groundwater body assessments

2.3.48 The assessment for each water body is presented in Annex B. WFD quality elements are listed in the left hand column, with scheme elements presented across the top of the matrix. Individual impacts arising from each scheme element are grouped into a set of columns under the scheme element.

2.3.49 An assessment of the effects of the scheme element is presented for each of the quality elements. At the end of the row, an assessment is made of the cumulative effects of the Proposed Scheme on the status/potential of that WFD quality element. Decisions regarding the cumulative effects on status are based on the approach presented in Table 6.

2.3.50 The prevention of future Good status assessment is presented at the base of each matrix for those groundwater bodies currently at Poor status. An assessment has been made taking into account the Reasons for Failure, Programme of Measures and RBMP mitigation measures.

Table 6: Decision matrix for assessing effect on groundwater body status class

Type of effect	Magnitude of impact of scheme element on WFD element i.e. in individual cells	Effect on WFD element at scale of scheme (at end of row)	Effect on WFD element at groundwater body scale (at end of row)	Example	Outcome
Green (no impact)	No measurable change to groundwater levels or quality.	No measurable change to any WFD elements.	No measurable change to any WFD elements.	Cutting above the water table.	No change
Yellow - localised/temporary adverse effect	Impacts when taken on their own have the potential to lead to a minor localised or temporary effect	Combined impacts have the potential to lead to a minor localised or temporary effect on the WFD element.	Combined impacts have the potential to lead to a minor localised or temporary effect on the WFD element. No change to groundwater body status.	Cutting below the water table but drainage returned to ground within the same groundwater body and surface water catchment.	No change in status of WFD water body when balanced against mitigation measures embedded in the scheme.
Amber - adverse widespread or prolonged effect	Impacts when taken on their own have the potential to lead to a widespread or prolonged effect.	Combined impacts have the potential to have an adverse effect on the WFD element.	Combined impacts have the potential to have an adverse effect on the WFD element, but not change its status at groundwater body scale.	Dewatering of cutting reduces baseflow to tributary but no adverse effects at scale of whole surface water body.	Adverse effect but risk of status change needs to be considered with any additional mitigation measures, and taking into account the level of confidence.
Red – adverse effect on overall WFD status of water body	Impacts when taken on their own have the potential to lead to a significant effect.	Combined impacts in combination with others will have a significant adverse effect on the WFD element	Combined impacts in combination with others will have an adverse effect on the WFD element AND change its status at the groundwater body scale	Dewatering of cutting reduces baseflow to surface water body with adverse effects at scale of whole surface water body.	Decrease in status of WFD water body when balanced against additional mitigation measures. Outcome is considered to be certain.

Assessment of compliance with WFD objectives

2.3.51 The assessment considers whether the Proposed Scheme complies with WFD objectives.

2.3.52 Where the failure to prevent deterioration in the status of a body of surface water or groundwater is the result of new modifications to the physical characteristics of a surface water body or alterations to the level of bodies of groundwater, Article 4.7 of the WFD states that there will be no breach of the WFD where:

- all practicable steps are taken to mitigate the adverse impact on the status of the body of water;
- the reasons for those modifications or alterations are specifically set out and explained in the RBMP;
- the reasons for those modifications or alterations are of overriding public interest and/or the benefits to the environment and to society of achieving the objectives set out in Article 4.1 of the WFD are outweighed by the benefits of the new modifications or alterations to (among other things) sustainable development; and
- the beneficial objectives served by those modifications or alterations of the water body cannot for reasons of technical feasibility or disproportionate cost be achieved by other means, which are a significantly better environmental option.

2.4 Baseline data sources, collation and presentation

Ecology baseline

2.4.1 The assessment is based on the following data sources:

- Environment Agency status information;
- baseline data collected as part of the EIA; and
- reviews of aerial imagery etc.

2.4.2 Further details of these data sources are presented in the following.

2.4.3 Updated status information for all water bodies affected by the route was obtained from the Environment Agency during 2013.

2.4.4 Ecological baseline data for WFD water bodies has been collected for the Environmental Impact Assessment. Relevant ecological survey data includes:

- macroinvertebrates;
- River Habitat Surveys (RHS);
- River Corridor Surveys (RCS); and
- fish.

2.4.5 Where no baseline data is available, for example where third party access was not granted, the water body assessment has been estimated based on the status class

information. Estimated assessments are precautionary (i.e. where there is doubt regarding the sensitivity of the species assemblage, a higher level of sensitivity has been assumed).

Macroinvertebrates

2.4.6 The macroinvertebrate baseline data includes biological indices (including BMWP, ASPT, LIFE and RICT scores). Species or taxa sensitive to the impacts arising from the Proposed Scheme are already highlighted in the baseline information presented in Volume 5 of the Environmental Statement, though this should not be relied upon exclusively. For water bodies at good or high status for macroinvertebrates, the review aims to identify whether species or taxa which may be key to determining the WFD status class are present within the survey area.

Fish

2.4.7 The baseline information presented in Volume 5 of the Environmental Statement includes reference to species protected under the Salmon and Freshwater Fisheries Act 1975[13] and EU Freshwater Fish Directive[14]. This fish data may be expressed in a number of formats. Environment Agency data uses:

- number of species;
- density; and
- standing crop.

RHS and RCS

2.4.8 The data from these surveys is not directly relevant to the WFD assessment, although the RCS provides some indication of macrophyte cover, and some useful contextual information on habitat quality and the potential influence of other pressures within the catchment (such as damage to channel habitats from grazing, existing structures, shading etc.). They also contain information on the principal plant species present and their extent.

Physico-chemical baseline

2.4.9 Physico-chemical sub-element status from the RBMP's has been included in the assessment workbooks. Where required, data on surface water discharge consents and dilution or mass balance calculations for specific water bodies was taken from the water resource appendices (WR-002).

Hydromorphology baseline

2.4.10 Hydromorphological surveys do not routinely form part of the suite of baseline surveys undertaken for EIA. Some hydromorphological information is collected as part of the RHS and river corridor survey methodology. However, the Environment Agency's internal guidance for WFD assessment recommends that specialised hydromorphological surveys, are also undertaken. Hydromorphology is the study of the physical form and function of water bodies, and the basis for assessing physical habitats and whether alterations to water bodies would be detrimental to existing or

[13] Salmon and Freshwater Fisheries Act 1975.
[14] Freshwater Fish Directive (78/659/EEC) 1995 to 2008.

potential water body functioning. It therefore also constitutes a substantial part of determining appropriate mitigation measures to offset the impacts of alterations.

Groundwater baseline

2.4.11 Baseline information on the groundwater bodies and on groundwater dependent features has been obtained from BGS and Environment Agency mapping and from the Volume 5 reports.

2.4.12 There is limited site-specific groundwater level or quality data. Groundwater data is generally obtained from boreholes. Although there are some boreholes along the route, none have been drilled for the Proposed Scheme. Where no baseline data is available the groundwater body assessment is precautionary.

2.4.13 GWDTE and potential GWDTE have been identified from published databases of designated statutory and non-statutory sites as well as water-dependent ecological features identified in the ES.

Proposed Scheme design information

2.4.14 Volumes 2 and 5 of the ES, and accompanying CT-05 and CT-06 map series are the primary sources of Proposed Scheme design information. The Volume 5 water resources appendices provide a site specific assessment of surface and groundwater bodies affected by the Proposed Scheme and the relevant scheme elements. The Volume 2 ecology (Section 7) and water resources and flood risk assessment (Section 13) topics provided more detailed information on complicated scheme elements with potentially more significant impacts.

2.4.15 The mitigation measures identified in the ecology and water resources and flood risk assessment topics have been taken into account in the WFD assessments.

2.4.16 Current engineering design data for each scheme element have been reviewed. The mitigation that has been built into the design has been taken into account in the WFD assessments.

2.5 Avoidance and mitigation measures

Avoidance

2.5.1 The Proposed Scheme design seeks to avoid direct or indirect harm to landscape, water and ecological resources, to mitigate adverse impacts where necessary, and to enhance such resources where practicable. Measures to achieve this will be commensurate with the sensitivity of the resource and will reflect the level of protection afforded such resources through relevant laws and policies.

2.5.2 This WFD assessment has been undertaken assuming all the mitigation measures presented in the ES are in place.

Design

2.5.3 The routing and design of the Proposed Scheme has sought, where practicable, to reduce environmental impacts to the water environment.

2.5.4 Key factors taken into account during planning and design include, but are not limited to, the following mitigation measures:

- avoidance or minimisation of temporary or permanent works in statutory or non-statutory sites designated for nature conservation, to areas of semi-natural habitat that are considered irreplaceable, and to areas that support protected, priority species or habitats;
- avoidance or minimisation of severance of areas of semi-natural habitat such as wetlands or watercourses;
- minimisation of barriers to animal movement;
- avoidance or minimisation of direct impact to controlled surface waters, for example through the design of culverts and outfalls;
- protection of controlled waters (surface water and groundwater) from pollution such that relevant water quality standards and WFD status are maintained or, where practicable, improved;
- maintenance of groundwater levels, protection of groundwater resources and avoidance, where practicable, of interference with the operation of all water abstractions and protection rights;
- minimisation of changes to water flows and water quality downstream by ensuring that there is minimal opportunity for pollution of existing watercourses through incorporation of appropriate separators and isolation valves;
- avoidance or minimisation of discharge to sensitive sites such as SSSI or SPZ;
- avoidance of permanent dewatering and re-routing of groundwater flows if impeded by permanent works;
- disposal of railway drainage and other discharges to surface water and groundwater in accordance with Environment Agency pollution prevention guidelines and Environmental Permitting Regulations[15]; and
- avoidance, where practicable, of reduction in river or stream base flow, which would reduce the potential to support aquatic and riparian communities and fisheries.

2.5.5 The Proposed Scheme will, where it is reasonably practicable to do so, aim to minimise adverse ecological impacts through avoiding ecological impacts at source.

2.5.6 In addition to mitigation measures, compensation measures have been included within the Proposed Scheme design process. Where reasonably practicable, habitat creation or enhancement measures have been incorporated into the design.

2.5.7 The design elements have been development in accordance with current best practice, including compliance with guidance such as CIRIA C689 'Culvert design and operation guide'[16], CIRIA C697 'The SuDS Manual'[17], the Design Manual for Roads and Bridges (DMRB)[18] and the ICoP for Sustainable Drainage Systems[19].

[15] Environmental Permitting Regulations (England and Wales) 2010 and amendments.
[16] Balkham. M., Kitchen, A., Fosbeary, C. (2010) *Culvert Design and Operation Guide. CIRIA Report C689*.

Construction

2.5.8 A range of mitigation measures have been proposed to prevent derogation of water resources and ecological function during construction.

2.5.9 Management of risks to water bodies during construction includes, but is not limited to, the following mitigation measures:

- compliance with the agreed Code of Construction Practice (CoCP);
- limit the working width as far as is practical in sections of the route passing through sites and habitats of known conservation value;
- where possible avoiding fragmentation and isolation of habitats, species or features so that all retained habitats/species/features continue to be viable. However, where there is no option but to cause fragmentation/severance, attempt to maximise the size of the habitat/population/feature which is considered to be of the greatest value;
- locating temporary works compounds, storage areas and temporary haulage routes within areas known to be of limited nature conservation value;
- ensuring that engineering design retains an adequate 'buffer' around sites, habitats or features of ecological value, sufficient in order to ensure their continued ecological functionality. The scale of the required buffer will be site specific and should take into account the nature of the features for which it is of value. Suitable fencing to maintain such buffer zones should be specified where this is considered to be required;
- minimising the impacts of severance as a consequence of the Proposed Scheme through the inclusion (where practical and reasonable to do so) of features to facilitate movement of species across the track alignment at key locations, such as oversized culverts etc., at appropriate locations identified from baseline data. Where necessary these features should be used in conjunction with the use of appropriate wildlife proof fencing (e.g. permanent amphibian fencing) and any landscape planting required to increase their effectiveness;
- minimising the requirements for temporary watercourse diversions required during construction and putting in place appropriate measures to minimise impacts on habitats/sites of nature conservation value;
- utilising best practice methodologies for earthworks, including the removal, handling and storage of soils, with, in particular, adoption of appropriate measures to prevent surface water run-off carrying sediments and pollutants;
- where sites/habitats/species of significant ecological value are subject to temporary works appropriate measures will be specified to re-instate or recreate these habitats;

17 Woods Ballard, B., Kellagher, R. (2007), *The SUDS Manual. CIRIA Report C697*.
18 Design Manual for Roads and Bridges.
19 CIRIA (2004), *Interim Code of Practice for Sustainable Drainage Systems: National SUDS Working Group*.

- control of surface water discharge from the site, both in terms of attenuation, flood management and pollution control. This will include the use of silt ponds where appropriate;
- minimising dewatering requirements, including the use of temporary cut-off walls if needed;
- control of materials, including temporary material stockpiles, bunding of stored chemicals, fuels, oils etc.; and
- contingency planning for spillages and floods.

Operation

2.5.10 A range of mitigation measures have been proposed to prevent derogation of water resources and ecological function during operations.

2.5.11 Operational risks will be mitigated primarily through the design process.

2.5.12 Additional mitigation for the operational phase includes, but is not limited to, the following measures:

a draft operation and maintenance plan (see Section 4 of this appendix) aimed at ensuring that potential impacts occurring as a consequence of the Proposed Scheme are minimised. This will include contingency plans to manage the consequences of unplanned incidents and protocols for use of pesticides and herbicides; and

- monitoring and management of water, habitats and species to demonstrate that ecological functionality has been maintained.

Investigation and monitoring

2.5.13 Site-specific intrusive ground investigation and monitoring for the Proposed Scheme will be undertaken.

2.5.14 In accordance with the draft CoCP, Section 16, monitoring will be undertaken in consultation the Environment Agency prior to, during and post-construction, if required, to establish baseline conditions for surface water and groundwater and to confirm the effectiveness of agreed temporary and permanent mitigation measures.

2.6 Surface water body assessment

2.6.1 Table 7 presents a list of assumptions regarding each of the scheme elements which provide the basis of the surface water assessment.

Table 7: Scheme element assumptions

Scheme element	Assumptions
Bored tunnel	Bored tunnels have been assumed to have no impacts associated with above-ground land requirements for the construction or operation of the Proposed Scheme except where the Proposed Scheme design information indicates that a slab is required in the river bed.
Viaduct	All viaducts would have track drainage discharging to the water body.
Clear span bridge	For crossings comprising clear span bridges it is assumed that there will be no structures in the bed or banks of the water body.

Scheme element	Assumptions
	All clear span bridges would have track drainage discharging to the water body.
Culvert	Culverts would be designed so as to maintain the same pre-scheme flow conveyance capacity for events up to the 1 in 100 year (with an allowance for climate change). The culvert design will maintain the natural bed profile within the channel, both in terms of channel gradients and substrates, the latter being achieved by setting culvert bases well below bed level.
	Except where specifically stated a 'buffer' zone will be created up and downstream of culverts to allow for the creation of habitats which will both enhance the watercourse, and features such as pools which will allow fish to rest before entering the culvert.
Siphons	Siphons would be designed so as to maintain the same pre-scheme flow conveyance capacity for events up to the 1 in 100 year (with an allowance for climate change).
River diversions	River diversions will be designed to include a range of habitats appropriate to the affected water body, including, for example, channel habitats such as pools, riffles, and runs; and marginal habitats such as berms for colonisation by emergent vegetation.
	In general it is assumed that the existing hydromorphological regime will be maintained within the diverted channel as far as possible. In some cases, where hydromorphology has been modified historically, HS2 presents opportunities to substantially restore channel reaches. However, in some cases, where the diversion significantly increases or shortens the length of the river, there remains a risk that flow dynamics will be altered and stream processes disrupted. In these cases a precautionary approach has been adopted to the assessment.
	River diversions will be created and vegetation allowed to establish within them prior to the removal of the existing river channel.

Biological assessment

2.6.2 The assessment on biological sub elements considered effects which may arise from the impacts described in Table 3. The following assumptions were made in relation to the biological assessment:

- Phytoplankton elements are scoped out based on the assumption that draft CoCP measures are implemented during construction and there will be appropriate track drainage to prevent any effects in relation to discharge of nutrients.
- Certain crossing types, such as culverts and siphons, have the potential to act as a barrier to migratory species within a catchment; all WFD classified water bodies upstream of crossing points have been identified and assessed.
- Impacts on groundwater dependent terrestrial ecosystems and Natura 2000 protected areas are scoped in but the assessment of status is linked to groundwater status and therefore covered under the groundwater matrix.
- Hydromorphological sub-elements are only assessed against standard for water bodies that have a high classification for hydromorphological elements. For water bodies at good status or lower, the hydromorphological assessment has been used to inform the assessment for the biological sub-elements.

2.6.3 The following section describes the generalised effects that were considered for each of the biological quality elements in relation to the scheme elements described in

Table 3. The specific findings of the no deterioration assessment are presented later in this section.

2.6.4 The assessment of effects on biological elements (macrophytes, macroinvertebrates and fish) is informed by the Environment Agency status class information, and data collected during the baseline surveys conducted for the ES (Section 3.7 of this appendix). Baseline data is presented in ecology appendices (Volume 5).

Land required for the construction or operation of the Proposed Scheme

2.6.5 River diversions will give rise to temporary loss of macrophyte and macroinvertebrate communities, and macrophyte, macroinvertebrate and fish habitats. Although river diversions will be established prior to the removal of the existing watercourse, and therefore there will be an opportunity for some establishment of new habitats prior to the loss of the existing watercourse, there may be a temporary loss of habitat. It is assumed that establishment of vegetation (and hence macroinvertebrate and fish habitat) within the river diversions will take one to two years.

2.6.6 Loss of the existing watercourse and the creation of the new diversion were considered separately since they represent different scheme elements. However, the negative effects of the land requirements and the positive benefits of habitat creation associated with a river diversion were balanced in the overall assessment of effects for an individual quality element.

Shading

2.6.7 Shading due to culverts will result in the complete loss of macrophyte communities within the culverted section. Although macroinvertebrates are considered to be insensitive to shading, effects were considered in terms of the loss of macrophyte communities on which macroinvertebrates may depend for foraging and refuge.

2.6.8 Habitats for all biological quality elements will be created within the 40m buffer zones up and downstream of the culvert. The effects of the land requirements to create a culvert, and the permanent loss of macrophytes due to shading were considered separately.

2.6.9 The effects of shading on fish are potentially more significant, since there is a risk that it could represent a barrier to migration. To mitigate this effect culvert design follows good practice guidance[20] in ensuring that the conditions within the culvert are not substantially different from the watercourse up and downstream. Culverts are not therefore considered to represent a barrier to migration although, when considered in combination with other scheme elements, there remains a risk of deterioration. An amber risk has been applied for water bodies where the fish quality element is at high or good, or the water body is designated as a salmonid fishery under the Freshwater Fish Directive, and there are multiple scheme elements on the main water body and tributaries.

[20] Scottish Environmental Protection Agency (2012), *River Crossings and Migratory Fish: Design Guidance*.

Changes to water body hydromorphology leading to changes in river processes and habitats up and downstream

2.6.10 Changes to the hydromorphological regime arising from culverts and river diversions were considered in relation to macrophyte communities, since significant changes could result in scour which may cause the loss of macrophyte beds. However, in most cases effects were considered to be no more than minor adverse since the design aim is to maintain the natural bed profile and hydromorphological regime up and downstream of the culvert.

2.6.11 Macroinvertebrate communities are generally more sensitive than macrophytes to changes in hydromorphology. For water bodies where this quality element is currently at high or good status, even minor changes in the hydromorphological regime, particularly where they occur across a number of scheme elements, was considered to give rise to a risk of deterioration. In cases where impacts only occurred on minor up or downstream tributaries for which no data was available consideration was given to the proximity of scheme elements to the main water body and the approximate distance that impacts would persist up or downstream.

Changes in flow velocity and volume due to de-watering

2.6.12 Dewatering of cuttings has the potential to reduce base flows within surface water bodies, whilst recharge may result in localised increases in depths and flow velocities. Both have potential for effects on biological quality elements. Reduced base flows may cause water levels to drop, particularly during periods of low flow, leading to potential changes in hydromorphology and water chemistry. Effects include potential changes in the relative extent and distribution of marginal, emergent and submerged macrophyte communities.

2.6.13 Reductions in flow velocity could result in changes in composition of macroinvertebrate and fish communities, particularly where they are characterised by flow sensitive species and taxa. Changes in level may give rise to a reduction in the wetted perimeter of the channel and therefore loss of macroinvertebrate and fish habitat.

Drainage

2.6.14 Changes in water quality due to drainage from surface scheme elements such as viaducts, and from recharge of groundwater to a surface water body were considered separately in relation to macrophytes. All drainage to surface water bodies will be attenuated and no changes in water quality are anticipated.

2.6.15 In considering the overall impact of the Proposed Scheme on macrophyte communities, consideration was given to the cumulative loss of macrophyte habitats relative to the overall water body length, and the status, and therefore sensitivity of the macrophytes present.

Creation of new habitats

2.6.16 It is assumed within the assessment that all river diversions will be designed to include new riparian habitats, including pools, riffles and marginal berms. Diversions will be designed to maximise the hydromorphological diversity of the channel, and thus biodiversity value. Details of the river diversions will be available at the detailed design

stage. In most cases the river diversions are considered to have a minor beneficial effect on biological quality elements since the design aim to replicate or improve upon the existing riparian habitat.

Noise and vibration

2.6.17 Noise and vibration is scoped in as a potential impact for fish only. Although noise and vibration during construction will be controlled through CoCP measures, minor localised and temporary effects are anticipated on fish populations for scheme elements which impact directly on water bodies. Taken in isolation it is not considered to give rise to any risks of deterioration, although it has been considered in combination with other effects.

Physico-chemical assessment

2.6.18 The majority of water quality related impacts have been scoped out of the WFD assessment. This is based on the assumptions that:

- relevant CoCP control measures will be implemented during construction which would minimise the likelihood of construction related water quality impacts; and
- there will be appropriate track drainage and a suitable maintenance regime to minimise any effects in relation to discharge of surface runoff.

2.6.19 However, unless stated otherwise, track drainage from bridges and viaducts would be discharged directly to the watercourse that it crosses and for these crossing types, there could be the potential for impacts to water bodies that have a high physico-chemical status, particularly with respect to specific pollutants.

Land required for the construction or operation of the Proposed Scheme

2.6.20 Land requirements was not considered an impact to any physico-chemical sub-element and therefore not considered further in the assessment.

Shading

2.6.21 Shading from culverts, siphons and viaducts was considered as an impact to dissolved oxygen and temperature only. The length of culvert was also considered during the assessment.

Changes to water body hydromorphology leading to changes in river processes and habitats up and downstream

2.6.22 Changes to the hydromorphological regime arising from culverts, siphons, viaducts (with footings in watercourse) and river diversions were considered in relation to the release of nutrient rich sediment from scour and sediment re-suspension during construction.

Changes in flow velocity and volume due to dewatering

2.6.23 Dewatering effects were considered for cuttings, retaining walls, river diversions, and green tunnels. Where these scheme elements are large, or span across multiple catchments, groundwater flows and surface water drainage may be significantly altered as a result of dewatering activities or drainage design. In some cases, this can

lead to reduced groundwater contributions to surface water and redistribution of surface water between different catchments.

2.6.24 Changes in the flow and volume of water will alter concentrations of certain physico-chemical sub-elements including dissolved oxygen, phosphate, ammonia and specific pollutants by reducing turbulence and oxygenation, and reducing the water bodies' dilution potential. This effect is further exacerbated on water bodies already impacted by current abstractions.

Drainage

2.6.25 Measures (draft CoCP, Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect for all scheme elements.

2.6.26 Where a bridge or viaduct spans a large water body or floodplain, track drainage would be discharged directly to the water body that it crosses and for these crossing types, there could be the potential for impacts to water bodies that have a high physico-chemical status, particularly with respect to specific pollutants. Mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.

Creation of new habitats

2.6.27 In most cases, river diversions are considered to have a minor beneficial effect on the dissolved oxygen sub-element since the design will aim to replicate or improve upon the existing hydromorphology by incorporating pools and riffles within the watercourse. No effect is anticipated on any other physico-chemical sub-element.

Noise and vibration

2.6.28 Noise and vibration was not considered an impact to any physico-chemical sub-element and therefore not considered further in the assessment.

Hydromorphological assessment

Overview

2.6.29 Assessments for hydromorphology were undertaken for each water body for the following WFD elements:

- quantity and dynamics of river flow
- connection to groundwater
- river continuity
- river depth and width variation
- structure and substrate of river bed
- structure of riparian zone

2.6.30 In addition, specific assessments on the structure of channel banks, channel platform stability and sediment transport regimes were integrated into the WFD elements listed.

2.6.31 The level of detail and the temporal and spatial extents of the assessment have been tailored to each site. Where scheme elements were identified which were not directly linked to a watercourse (for example viaducts with footings in the floodplain), a short screening assessment and check has been undertaken. Where scheme elements were identified which were directly linked to a watercourse (for example river diversions or culverts) a more thorough investigation has been carried out.

2.6.32 Baseline hydromorphological information has been summarised for sensitive water bodies or crossings, however baseline conditions were not described for the majority of crossings as these constitute field drains or small tributary watercourses and therefore do not require detailed hydromorphological baseline.

Approach

2.6.33 High level hydromorphological processes have been interpreted from maps, photographs and ecology surveys (where available) using judgement, in the absence of specific hydromorphological surveys. The potential impacts and effects on attainment of WFD status have been assessed through consideration of the Proposed Scheme detail in the context of the size and potential disruption to the impacted watercourse.

2.6.34 Changes to hydromorphology were assessed in terms of the potential to disrupt the existing hydraulic and sediment transport regimes of water bodies, both at the crossings, and upstream and downstream. Changes to the function of the water body could affect the form of the water body in terms of promoting scour or aggradation, or changing wetted areas and flow properties that constitute aquatic or water-dependent habitats.

2.6.35 For crossings of undeveloped channel reaches, new engineering structures and modifications would generally be detrimental to existing hydromorphological processes. For HMWB, where water body form and function have been modified historically, new modifications are less likely to have significant detrimental effects to existing conditions or impede future mitigation measures, and may present the opportunity to restore channel reaches to pre-modified conditions. In all cases, a catchment-based approach was taken to assessing the potential impacts of the crossings in the context of channel reaches, water bodies and connecting water bodies.

Land requirements for construction and operations, shading, noise and vibration

2.6.36 None of these factors would be expected to affect hydromorphology and have not been assessed.

Changes to water body hydromorphology leading to changes in river processes and habitats up and downstream

2.6.37 Tunnels under a watercourse were generally considered to be highly unlikely to have any effect on surface water hydromorphology, unless the tunnel could create fissures resulting in loss of surface water flow or changes to the channel bed.

2.6.38 Open span bridges or viaducts with footings set back from the channel were generally considered to have no significant effects on hydromorphology. Engineering works

may result in some small obstacles to peak flood flows across floodplains or riparian zones, but these impacts were considered unlikely to be significant. Open span bridges or viaducts with footings close to bank tops were also generally considered unlikely to be detrimental to hydromorphology. Some risks associated with viaducts have been highlighted for a small number of water bodies. For example where minor channel diversions are required to avoid viaduct footings, the risk of scour could increase as the river tries to regain its natural form, meaning that unchecked lateral channel movement could result in footings in the channels. This could mean that extensive bank reinforcement works are necessary to control the realigned channel form, with impacts on flows, bank conditions, natural bank erosion and sediment dynamics. Generally, these effects would be localised and more likely to result in local diversity of channel form, rather than deterioration.

2.6.39 Culverts almost always change a significant proportion of the natural banks, riparian zones, and floodplain and in-channel flow processes, and therefore sediment processes, along the stream and across and out of the channel. It is generally more cost efficient to construct straight culverts perpendicular to crossings, so river realignment is often also necessary upstream and downstream of the culverts. By changing the channel course and shape, and cutting off out-of-channel flows, natural river bed and bank erosion, sediment erosion, transport or deposition is also changed. The river may try to regain a natural balance by eroding its bed or banks adjacent to the culvert. This can result in sharp changes in flow patterns and bed gradients (even resulting in 'steps' forming between the rigid culvert base and the erodible bed), which are detrimental to river flow and habitat continuity, and can have implications for the passage of fish and other species.

2.6.40 River diversions can be threats or opportunities to natural river processes and WFD objectives. If the river is of a natural form without any alteration, it is likely to be self-regulating and sustainable, so diverting the river will probably trigger a channel response as it tries to regain its natural form. If the river has already been diverted (most often straightened as part of a HMWB), there are opportunities to rehabilitate or implement some natural processes. In these cases, diversions are unlikely to cause deterioration from existing conditions, and there may be opportunities to benefit hydromorphology (e.g. by increasing planform sinuosity) and habitats. However, in HMWB, particularly heavily urbanised water bodies, there is often no space around the watercourse to implement substantial improvements.

2.6.41 Straightening shortens a channel and therefore results in direct loss of habitat. It also increases the slope between two points on a gradient which increases flow velocity and stream power, so flows may become unnaturally fast for fish and invertebrates, and bed substrate habitats may be scoured.

2.6.42 Lengthening a channel increases the extent of open watercourse, but it decreases gradients and flow velocities, and this promotes increased sedimentation, which is detrimental to bed substrates, so there are unlikely to be major benefits to ecology. However, if the channel has been straightened historically, lengthening the channel by increasing sinuosity or re-meandering would help to restore natural hydromorphological processes.

Dewatering of excavations during construction and operation

2.6.43 Dewatering reduces flow rates (particularly at low flows for streams that are groundwater fed), which has implications for flow diversity, velocity and turbulence, and flow depths, widths and wetted areas. Decreasing flow rates also decreases sediment conveyance, promoting increased sediment deposition and residence time within a reach, which can be detrimental to bed structure and composition. Groundwater inflows to streams are typically 'clean', as opposed to sediment-laden surface runoff, so loss of groundwater can also impact hyporheic bed quality due to changes in upwelling.

Drainage

2.6.44 It has been assumed that drainage from new impermeable surfaces will be managed using sustainable drainage systems, so there would be no impacts on flow volumes and timings, and no increases in sediment delivery to the water bodies.

Creation of new habitats

2.6.45 New habitats may be created by diverting channels that have previously been modified, or by retaining abandoned channels as wetland habitats. These can constitute major advantages in WFD terms, and the HS2 developments can in some cases be viewed as significant opportunities to restore or improve historically modified water bodies. In other cases, such as minor diversions of drainage ditches, it is difficult to justify that there will be any significant creation of new habitats, and this has been stated in the assessments.

Surface water assessment findings

No deterioration assessment

2.6.46 The surface water assessment results are contained in Annex A.

2.6.47 Of the 60 surface water bodies affected by the Proposed Scheme, 15 were considered to be at amber risk of deterioration as a result of effects on one or more of the quality elements. Of these water bodies assessed at amber risk, four are considered to have a higher risk of deterioration in status or potential. For the remaining 11 water bodies, it is considered less likely that deterioration in status will occur.

2.6.48 The remaining 45 water bodies were considered to have either minor effects or no effects likely to result in deterioration of any of the quality elements.

2.6.49 A summary of the results of the assessment for the 15 amber risk water bodies are presented by catchment in Tables 8 to 13. In summary, the water bodies are distributed across the catchments as follows:

- one in the Colne catchment;
- two in the Thame and South Chiltern catchment;
- three in the Cherwell catchment;
- four in the Upper and Bedford Ouse catchment;
- two in the Warwickshire Avon catchment; and

- three in the Tame, Anker and Mease catchment.

2.6.50 Of these, the water bodies that are considered to have a higher risk of deterioration include the River Blythe (from Patrick Bridge to the River Tame), River Ouse (GB105033037880), Stoke Brook, and Padbury Brook (The Twins).

2.6.51 Combined hydromorphological and biological effects were considered to give rise to a potential risk of deterioration in two of the four water bodies (Stoke Brook and Padbury Brook (The Twins)). In both cases, river diversions, and/or culverting would occur on significant lengths of the water body or its major tributaries. Whilst the design aim for river diversions is to ensure that the existing hydromorphological regime is maintained, where the diversion is considered to increase the length of the water body there is a risk of reducing flow rates and disrupting stream processes. Similarly, long culverts (for example, the temporary and permanent culverts on the Padbury Brook) have the potential to disrupt stream processes and continuity. In the case of the Padbury Brook, macroinvertebrates are at good status and fish are at high status, and are therefore considered to be sensitive receptors. For the Stoke Brook the status of the biological receptors is unknown and therefore a precautionary approach has been adopted.

2.6.52 For the River Blythe (Patrick Bridge to River Tame) there would be localised impacts from culverts on tributaries of the Blythe including the Holywell Brook, Shadow Brook and un-named tributary. Although there would be enhancements to the water body from the removal of culverts and associated with river diversions, there would also be de-watering impacts from the Diddington cutting on the Holywell Brook and cumulative impacts with the upstream R Blythe water body (Temple Balsall Brook to Patrick Bridge) (GB104028042571).

2.6.53 For the River Ouse (GB105033037880) effects could arise from potential permanent flow reductions on a major tributary as a result of de-watering of the Brackley South cutting. Whilst effects on the R Ouse itself would be minimal since water would be returned to the river, given the high status of fish in the Ouse and the lack of certainty over the value of the tributary for migratory fish, a precautionary approach has been adopted.

2.6.54 Of the 11 water bodies graded amber but where deterioration is considered unlikely, effects on biological elements alone were considered to give rise to a potential risk of deterioration for seven water bodies (Colne, River Blythe from Temple Balsall Brook to Patrick Bridge, East Litchfield catchment tributary of Tame, Radstone Brook, Finham Brook, Cherwell (Ashby Brook to Cropredy) and Cherwell (Cropredy to Nell Bridge)). On the Colne, Blythe, and Cherwell either fish or invertebrates or both were at high or good status, and the water body or its tributaries are directly affected by scheme elements. In some cases, such as the Colne, effects may be temporary during the period in which the river diversion establishes, but there remains a potential risk that the most water quality sensitive component of the invertebrate community could be lost.

2.6.55 For East Litchfield catchment (tributary of Tame), Radstone Brook and Finham Brook, no status information is available and hence the assessment is precautionary. In the case of the Radstone brook, the fish quality element is known to be a high status for the downstream R Ouse, whilst the Finham Brook is designated as a salmonid fishery

under the Freshwater Fish Directive. In the case of the Finham Brook, whilst the direct impacts from scheme elements are considered to be relatively minor and localised, there is a risk of cumulative effects with the upstream Canley Brook. However, deterioration of the status or potential of the water bodies is considered unlikely.

2.6.56 For the remaining 3 water bodies (Tetchwick Brook, Fleet Marston Brook, and the Twin) the potential risk of deterioration is from hydromorphology alone due to multiple culverts on tributaries. However, deterioration of the status or potential of the water bodies is considered unlikely. In these cases, the biological elements are currently at moderate or lower status and are not considered to be sensitive to further deterioration.

2.6.57 Biological and physico-chemical effects were identified as amber for the Colne and GUC water body. Diversion of the River Colne will result in localised loss of riparian habitat which is considered to represent a risk of deterioration for macroinvertebrates, which are currently at good status. Permanent discharge of track drainage to Long pond is considered to represent a risk of deterioration due to specific pollutants given that the water body is currently at high status for that quality element. However, deterioration of the status or potential of the water body is considered unlikely.

Table 8: Colne catchment summary - key risks to surface water status

Water body name and ID	CFA	WFD element (Sub-element - status)	Comment
Colne and Grand Union Canal GB106039023090	7	Biology (Macroinvertebrates - Good)	River diversions will cause a temporary loss of macroinvertebrates and their habitat from the River Colne and Newyears Green Bourne channels. There will be loss of bank habitat and macrophyte cover (which represents macroinvertebrate habitat) within the one culvert on the unnamed tributary. Taking into account the planned habitat creation measures, the risk that the most water quality sensitive components of the community may be lost, is reduced and hence it is considered unlikely that deterioration in status or potential would occur.
		Physico-chemical (Specific Pollutants (Annex VIII) - High)	Permanent drainage from the Colne Valley viaduct will be discharged directly into the lakes. Long Pond is the smallest water body crossed by the viaduct and therefore the dilution ratio is significantly low. Long Pond is within the SSSI and is therefore a very high value receptor. This may give rise to increased concentrations of Specific Pollutants (as a result of track drainage) within the water body.

Table 9: Thame and South Chiltern catchment summary - key risks to surface water status

Water body name and ID	CFA	WFD element (Sub-element - status)	Comment
Fleet Marston Brook GB106039030420	11, 12	Hydromorphology (All)	Potential cumulative adverse effect on hydromorphology from multiple culverts on a number of small tributaries of the relatively small Fleet Marston Brook water body. The culverts are generally on field drains, however, and it is considered unlikely that deterioration of the status or potential of the water body would occur.
Stoke Brook GB106039030320	10, 11	Biology (Macrophytes - no status) (Macroinvertebrates - Moderate) (Fish - no status)	De-watering of the Wendover North cutting may lead to the drying of some tributary streams during dry weather flows. There will also be multiple culverts on tributaries. Although there will be habitat created associated with the culverts and river diversions, due to the lack of baseline data available, therefore a precautionary approach has been taken. It is considered possible that deterioration in water body status or potential could occur.
		Physico-chemical (Phosphate - Moderate)	Dewatering and drainage of Wendover North cutting is likely to have an adverse impact on water flow and volume in Stoke Brook. Water discharged approximately 1km downstream of springs with potential effects on dry weather flow of upstream areas of Stoke Brook and tributaries. Water quality could be compromised in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source (one private discharge on Stoke Brook) and diffuse pollution. Therefore, there is a potential risk of deterioration of the WFD status for phosphate.

Water body name and ID	CFA	WFD element (Sub-element - status)	Comment
		Hydromorphology (All)	The impacts of diverting and culverting approximately 300m of the 9.59km, good overall status Stoke Brook could be severe, because of extensive culverts disrupting stream processes and continuity of the undeveloped part of the principal watercourse, where macroinvertebrate status is moderate and could be sensitive to hydromorphological impacts. The culverts are likely to result in adverse effects on the water body hydromorphology that could place the overall status class at risk.

Table 10: Cherwell catchment summary - key risks to surface water status

Water body name and ID	CFA	WFD element (Sub-element - status)	Comment
Cherwell (Ashby Brook to Cropredy) GB106039037350	15	Biology (Macroinvertebrates - High) (Fish - Good)	Scheme elements present on the River Cherwell and its main tributary, Ashley Brook, are identified as having the potential for very localised adverse effects (viaducts) or temporary adverse effects (river diversion) that would be balanced by the creation of new habitats. In addition to a short river diversion and viaducts, smaller tributaries are also impacted by several culverts. Baseflows within the tributary watercourses may be affected by dewatering of two cuttings. Given the relatively low contribution of the smaller tributaries (drainage ditches) to the River Cherwell, their cumulative effect is however likely to be low at the scale of the water body. However, no data is available for the River Cherwell on the impacted stretch. Given the high status of the water body for macroinvertebrates and fish and the potential for minor adverse effects, an amber grading has been applied. However, it is considered unlikely that deterioration in status or potential would occur.
Cherwell (Cropredy to Nell Bridge) GB1060339037310	15	Biology (Fish - Good)	The presence of culverts on several tributaries of the River Cherwell (WB GB106039037350) could have an adverse effect on this quality element. The watercourse is a Freshwater Fish Directive designated water body. As no data is available for fish for the watercourse, an amber grading has been applied. However, it is considered unlikely that deterioration in status or potential would occur.
Tetchwick Brook GB106039030070	12	Hydromorphology (All)	Multiple culverts and river diversions on small unnamed tributaries are unlikely to adversely impact flow rates and dynamics. However, there is likely to be several hundred metres of culverts on the tributaries, including river diversions, which would reduce the amount of the open watercourses of the water body. Therefore, there is potential for many local impacts to cause a cumulative effect on hydromorphology on this water body. It is considered unlikely that deterioration in status or potential would occur.

Table 11: Upper and Bedford Ouse catchment summary - key risks to surface water status

Water body name and ID	CFA	WFD element (Sub-element - status)	Comment
Ouse	14	Biology (Fish - High)	The Great River Ouse is currently of 'High' status for fish. Potential permanent reduction on flow over 2/3 km of a major tributary of the

Water body name and ID	CFA	WFD element (Sub-element - status)	Comment
GB105033037880			Great Ouse (not affecting the Ouse itself). Although mitigation measures to address the potential impacts on flow are being considered, it will not be possible to state with confidence that there will be no deterioration of status at this stage. Therefore there is a potential risk of deterioration of the WFD status for fish. The risk of this occurring is considered to be high based on the available information.
		Physico-chemical (Phosphate - Good)	Dewatering and drainage of Brackley South cutting is likely to have an adverse impact on water flow and volume in a major tributary of the Ouse. Tributary affected but not Ouse itself as discharge point is upstream in catchment. Water quality could be compromised in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source (not possible to locate specific discharge consents on the tributary affected) and diffuse pollution. Therefore, there is a potential risk of deterioration of the WFD status for phosphate.
Padbury Brook (The Twins) GB105033038210	13, 14	Biology (Macroinvertebrates - Good) (Fish - High)	Currently of 'Good' WFD status for macroinvertebrates and 'High' for fish, which is supported by the baseline data collected on the main Padbury Brook watercourse, but not on the tributaries. Potential for cumulative effect from multiple localised adverse effects (viaducts), temporary adverse effects (river diversions), and minor adverse effects (temporary and permanent culverts and dewatering) on the main water body, upstream water body (GB105033030560) and tributaries. Embedded mitigation will help to offset negative effects, however, taking into account the number of scheme elements and the sensitivity of the receptor, there remains a potential risk of deterioration for macroinvertebrates. Important fish populations, including migratory brown trout, are recorded downstream on the Great River Ouse, which may use this tributary for spawning. Localised changes in flow dynamics and the presence of several culverts (not those located on minor drains, which do not appear to be of importance for fish) have the potential to impede upstream passage of any migratory fish. Embedded mitigation measures may not be sufficient in negating adverse effects to fish migration or loss of habitat. Therefore, there is a potential risk of deterioration of the WFD status for fish. The risk of this occurring is considered to be high based on the available information.
		Hydromorphology (All)	Diversion of main WFD watercourse has potential to impact diversity of flow dynamics. The lengthening of the channel may reduce flow rates (velocity and turbulence / mixing / flow aeration). Majority of the culverts and associated river diversions are on small tributaries to Padbury Brook and are likely to have local impacts on the diversity of flow dynamics and disconnect floodplains which is likely to have combined impacts at times of high flow. The scheme elements are extensive and therefore in combination may have potential to pose the risk of deterioration of hydromorphological status.
Radstone Brook GB105033037940	14, 15	Biology (All - Moderate ecological status)	No baseline data available, therefore a precautionary approach has been taken. Important fish populations are recorded downstream on the Great River Ouse, which may use this tributary for spawning. Localised changes in flow dynamics and the presence of several culverts within a short distance have the potential to impede upstream passage of any migratory fish. Taking into account embedded mitigation, it is anticipated that there would be no change in status to macrophytes and macroinvertebrates. However, embedded mitigation measures may not be sufficient in negating adverse effects to fish migration or

Water body name and ID	CFA	WFD element (Sub-element - status)	Comment
			loss of habitat. Therefore, there is a potential risk of deterioration of the WFD status for fish but this is considered unlikely.
Twin GB105033030560	13	Hydromorphology (All)	The nature of impacts, i.e. potential loss of drainage ditches and a pond ,extensive culverting and a siphon would result in extensive loss and deterioration of hydromorphological conditions The scheme elements are located on minor tributary ditches which are considered unlikely to have significant diversity of flow. However, the main water body is only 1.3km long and therefore the culverts affect a relatively high proportion of the overall water body length. Whilst potential risks have been identified, it is considered unlikely that deterioration in status or potential would occur.

Table 12: Warwickshire Avon catchment summary - key risks to surface water status

Water body name and ID	CFA	WFD element (Sub-element - status)	Comment
Canley Brook GB109054044520	18	Biology (Macroinvertebrates - Moderate) (Fish - no status)	Currently of 'Moderate' WFD status for macroinvertebrates, which is supported by the baseline data collected. No status for fish. Potential for cumulative effect from river diversions and culverts, although this will be balanced by habitat creation. Dewatering on the main water body and tributaries due to cuttings and the retaining wall are identified as having potential adverse effects on flows on the Canley Brook and its tributaries. Although the tributaries have a relatively low contribution to the whole water body, in the absence of baseline fish data for the tributaries, there remains a potential risk of deterioration for fish. Whilst potential risks have been identified, it is considered unlikely that deterioration in status or potential would occur.
		Physico-chemical (Phosphate - Moderate)	Possible adverse impacts on baseflow to diverted stretch due to loss of groundwater connection via alluvium deposits. Water quality could be compromised in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source (nine sewage discharge consents to Canley Brook and its tributaries) and diffuse pollution. Diversion details yet to be confirmed and may pose a potential risk of deterioration of phosphate status.
		Hydromorphology (All)	The diversion of Canley Brook is approximately 1 km in length, and in comparison to the overall length of the water body (11km), the diversion could potentially have adverse effects on 10 – 20% of the non-developed stream corridor. Diversion details are not yet confirmed and may pose the risk of deterioration of hydromorphological status. Whilst potential risks have been identified, it is considered unlikely that deterioration in status or potential would occur.
Finham Brook GB109054044480	18	Biology (Fish - no status)	The scheme elements present on Finham Brook are identified as having very localised (viaduct, cutting) or temporary (retaining wall) adverse effect on this quality element. However, cumulative effects from scheme elements located on the upstream water body (Canley Brook) are considered as having the potential for an adverse effect on this quality element on Finham Brook. Overall, and given that Finham Brook is a designated salmonid fisheries (Freshwater Fish Directive) and as both Canley Brook and Finham Brook currently support migratory fish species (brown trout), the Proposed Scheme is considered to have the potential for an adverse effect on this quality element at the water body scale. Whilst potential risks have been identified, it is considered unlikely that deterioration in status

Water body name and ID	CFA	WFD element (Sub-element - status)	Comment
			or potential would occur.
		Physico-chemical (Phosphate - Good)	Dewatering and drainage of Glasshouse Wood cutting is likely to have an adverse impact on water flow and volume in Finham Brook. Discharge will be downstream to the River Avon, with additional potential for a significant loss in groundwater contributions to Finham Brook. Water quality could be compromised in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source (five sewage discharge consents to Finham Brook and its tributaries) and diffuse pollution. Therefore, there is a potential risk of deterioration of the WFD status for phosphate.

Table 13: Tame Anker and Mease catchment summary - key risks to surface water status

Water body name and ID	CFA	WFD element (Sub-element - status)	Comment
River Blythe GB104028042572	19, 23, 24	Biology (Fish - High)	Fish status is currently 'High' and the River Blythe supports population of brown trout. Potential for cumulative effect from multiple localised adverse effects (viaducts), temporary adverse effects (river diversions), and minor adverse effects (culverts and dewatering) on the main water body, upstream water body (GB104028042571) and tributaries (Horn Brook, Hollywell Brook and Shadow Brook). Therefore, there is a potential risk of deterioration of the WFD status for fish.
River Blythe GB104028042571	23	Biology (Fish - High)	Fish status is currently 'High' and the River Blythe supports population of brown trout. Potential for cumulative effect from multiple localised adverse effects (viaducts), temporary adverse effects (river diversions), and minor adverse effects (culverts and dewatering) on the main water body and tributaries (Horn Brook and Bayleys Brook). Although culverts and river diversions will be designed to maximise habitat connectivity there remains a risk that in combination the structures will impede fish migration, particularly given the sensitivity of fish populations on the River Blythe. These effects are most likely to occur during the construction stage whilst the new channel and bed habitats establish. Therefore, deterioration of the fish status of the River Blythe water body cannot be ruled out.
East Litchfield catchment - tributary of Tame GB104028047020	22	Biology (All - Moderate ecological status)	The water body does not currently have a WFD status for macrophytes, macroinvertebrates or fish and is not known to be monitored for any of these elements. It is not a designated cyprinid or salmonid river. No baseline data available for macrophytes. Baseline data collected for macroinvertebrates indicated that they were of good biological quality, but also indicative of sedimented conditions. Baseline data collected for fish indicated only minor species were present, with limited fish habitat present. Dewatering of Swinfen cutting may lead to reduction in base flow. The water body is already impacted by existing abstraction. However, given that effects of dewatering from the Proposed Scheme are not considered to be severe, it is considered unlikely that deterioration in status or potential would occur.

Prevention of future ecological status objective

2.6.58 The Proposed Scheme crosses through four river basin districts; Anglian, Humber, Severn and Thames.

2.6.59 As part of this detailed assessment, a screening exercise has been carried out to ensure the construction and operation of the Proposed Scheme does not prevent a water body from achieving a future objective or alternative objective.

Screening

2.6.60 Only water bodies failing to meet good ecological status or good ecological potential, which are affected by the Proposed Scheme, were included. Reasons for failing to achieve good status were considered, with reasons not relevant to the Proposed Scheme being discounted and not assessed further. Table 14 lists those reasons relevant to the Proposed Scheme, and Table 15 lists reasons considered not relevant.

Table 14: Reasons for failure to meet good status relevant to the Proposed Scheme

Codes relevant to the Proposed Scheme	Element	Reason for failure	Relevant scheme elements
B2p	Biology	Morphology - Suspected	Culverts, River diversions, Siphons, Viaducts with footings in watercourse, Tunnel slabs
B2j	Biology	Hydrology (flows) - Suspected	Cuttings, Retaining Walls
HR2a	Hydrology	Abstraction - Uncertain there is a failure / impact	Cuttings, Retaining Walls
HR4a	Hydrology	Abstraction - Confirmed	Cuttings, Retaining Walls
INNS1a	Biology	Alien Species - Suspected	Culverts, River diversions, Siphons
M1a	Morphology	Physical modification flood protection - Suspected	Balancing ponds
M1d	Morphology	Physical modification barriers to fish migration - Suspected	Culverts, River diversions, Siphons
M3a	Morphology	Physical modification flood protection - Confirmed	Balancing ponds, Viaducts with footings on watercourse, Culverts
M3b	Morphology	Physical modification urbanisation - Confirmed	Culverts, River diversions, Siphons, Viaducts with footings in watercourse, Tunnel slabs
M3c	Morphology	Physical modification land drainage - Confirmed	Culverts, River diversions, Siphons, Viaducts with footings in watercourse, Tunnel slabs
M3g	Morphology	Physical modification inland navigation - Confirmed	Culverts, River diversions, Siphons, Viaducts with footings in watercourse, Tunnel slabs
P1a, P1b, P1c, P1d, P2a, P2b, P5c	Phosphate	Phosphate	Cuttings, Retaining Walls, River diversions

Table 15: Reasons for failure to meet good status not considered relevant to the Proposed Scheme

Codes not relevant to the Proposed Scheme	Element	Reason for non-inclusion
MS	Biology	Various pressures and sources, therefore element has not been included in the classification. As these elements are sensitive to morphological pressures, it is difficult to determine whether these biological elements in Artificial and Heavily Modified Water Bodies are at less than good status due to the effects of morphological changes alone or also the impacts from other pressures. Since no reason for failure has been identified, and therefore no alternative objective or future actions set, it is not possible to assess this against potential HS2 impacts.
A1a, A1b, A2a, A2b, A5c	Ammonia	Reason for failure directed at the Water industry. Main source of ammonia is discharges from STW's and diffuse agricultural pollution.
B2a	Biology	Reasons for failure unknown. Investigation required identifying pressure. HS2 will not inhibit future investigations.
DO1a, DO2a, DO2b, DO3b, DO5a	Dissolved Oxygen	Reason for failure directed at the Water industry. Main cause for reduced DO levels associated with discharge of organic material from STW's.
PH1a	pH	Uncertain there is a failure / impact. Additional monitoring required. It has been assumed that HS2 will not have an impact on pH. HS2 will not inhibit future monitoring.
P5c	Phosphate	Reason for failure

Results

2.6.61 After the screening process, 28 surface water bodies which are already failing to meet good status were considered to be failing for reasons which may be relevant to the Proposed Scheme. Table 16 lists those water bodies and the associated impact(s) which is believed to be causing the failure.

Table 16: Water bodies affected by the Proposed Scheme, with reasons for current failure deemed relevant to the Proposed Scheme

Water body name	Water body ID	Element not achieving 'Good' status	Pressure identified - certainty/confidence	Proposed Scheme relevant impact	Scheme element	Outcome
Brent (below Silk stream down to the Thames)	GB106039023590	Morphology	RBMP mitigation measures	None	Bored tunnel	None
Crane (including part of the Yeading Brook)	GB106039023030	Biology, phosphate, morphology	RBMP mitigation measures	None	No direct impact.	None
Yeading Brook (East Arm)	GB106039023050	Morphology	RBMP mitigation measures	None	Bored tunnel	None
Yeading Brook (West Arm)	GB106039023060	Morphology	RBMP mitigation measures	None	Bored tunnel	None
Pinn	GB106039023070	Morphology	RBMP mitigation measures	None	No impact	None
Colne and Grand Union Canal (from confluence with Chess to Ash)	GB106039023090	Hydrology, morphology	Abstraction - uncertain of impact RBMP Mitigation Measures	Dewatering - effect on flow	Colne Valley Viaduct. Dewatering of cofferdams temporary and localised in relation to overall size of water body.	None
Fleet Marston Brook, Denham Brook, Pitchcott Brook west	GB106039030420	Biology	Morphology - low confidence that pressure has been correctly identified	Culverting - (new culverts) Beneficial - habitat creation	Multiple culverts on Fleet Marston Brook and tributaries. Ecological mitigation areas set aside to counter balance effects of culverts.	None
Tetchwick Brook, Source to Ray and tributaries	GB106039030070	Biology	Morphology - low confidence that pressure has been correctly identified	Culverting - (new culverts) Beneficial - habitat creation	Multiple culverts on tributaries of Tetchwick Brook and Doddershall Brook. Ecological mitigation areas set aside to counter balance effects of culverts. Need for more baseline ecology data.	None
Ray and tributaries Northeast of Grendon	GB106039030100	Biology	Morphology - low confidence that pressure has been	Culverting (existing culverts being	River Ray culvert, multiple culverts on tributaries (Muxwell Brook, Greatmoor Ditch, Lee Wood Farm Ditch). Ecological mitigation areas set	None

Water body name	Water body ID	Element not achieving 'Good' status	Pressure identified - certainty/confidence	Proposed Scheme relevant impact	Scheme element	Outcome
Underwood			correctly identified	extended) Beneficial - habitat creation	aside to counter balance effects of culverts.	
Ludgershall Brook and Muswellhill Brook	GB106039030060	Biology	Morphology - low confidence that pressure has been correctly identified	None	No impact	None
Ouse	GB105033037860	Morphology	RBMP mitigation measures	None	No impact	None
Ouse (Beds)	GB105033037950	Morphology	RBMP mitigation measures Cutting - Reduced flow/volume of water	Dewatering - effect on flow	Greatworth South cutting. No current status for phosphate. Minor localised impact on small tributary of water body. Unlikely to have significant impact on flow rates due to the size of the tributary in relation to the wider catchment.	None
Radstone Brook	GB105033037940	Morphology	RBMP mitigation measures	None	No impact	None
Helmdon Brook	GB105033038230	Morphology	RBMP mitigation measures	None	No impact	None
Farthinghoe Stream (Source to Cherwell) and tributaries	GB106039037290	Phosphate	Cutting - Reduced flow/volume of water	Dewatering - effect on flow	Greatworth green tunnel. Water body is at Poor for phosphate, dewatering of green tunnel may reduce baseflows of spring fed stream and reduce dilution potential. One sewage discharge consents on water body.	None
Cherwell (Cropredy to Nell Bridge)	GB1060339037310	Biology. phosphate	RBMP mitigation measures	None	No impact	None
Highfurlong Brook (Wormleighton to Cherwell)	GB106039037330	Biology	Morphology - low confidence that pressure has been correctly identified Hydrology (flows) - low confidence that pressure has been	None	No impact	None

Water body name	Water body ID	Element not achieving 'Good' status	Pressure identified - certainty/confidence	Proposed Scheme relevant impact	Scheme element	Outcome
			correctly identified			
River Avon (Warks) - confluence with River Sowe to confluence River Leam	GB109054043840	Biology, phosphate	Cutting - Reduced flow/volume of water	Dewatering - effect on flow	Agricultural Centre cutting is likely to lead to localised reduction in flows on the River Avon during dewatering. Localised and temporary adverse effect anticipated.	None
River Avon - Claycoton Yelvertoft Brook to confluence with River Sowe	GB109054043920	Biology, phosphate, morphology	Physical modification barriers to fish migration - uncertain of impact Cutting - Reduced flow/volume of water	Dewatering - effect on flow	Agricultural Centre cutting is likely to lead to localised reduction in flows on the River Avon during dewatering. Localised and temporary adverse effect anticipated.	None
River Sowe - confluence with Smite Brook to confluence with River Avon	GB109054044540	Biology, phosphate, morphology	Invasive species - low confidence that invasive species is causing impact Physical modification barriers to fish migration - uncertain of impact	None	No impact	None
Finham Brook - confluence with Canley Brook to confluence with River Sowe	GB109054044480	Hydrology, biology	Abstraction - uncertain of impact Morphology - low confidence that pressure has been correctly identified Invasive species - low confidence that invasive species is causing impact Cutting and diversion - Reduced	Dewatering - effect on flow	Glasshouse Wood cutting dewatering impact on Finham Brook likely to be significant. Discharge will be downstream to the River Avon, with potential for a significant loss in GW flow to Finham Brook. The water body is restricted from attaining Good Ecological status due to current abstractions; hydrology 'does not support good status'.	At risk

Water body name	Water body ID	Element not achieving 'Good' status	Pressure identified - certainty/confidence	Proposed Scheme relevant impact	Scheme element	Outcome
			flow/volume of water			
Canley Brook - source to confluence with Finham Brook	GB109054044520	Phosphate, hydrology	Abstraction - uncertain of impact Cutting and diversion - Reduced flow/volume of water	Dewatering - effect on flow Diversion - loss of SW/GW connection	Crackly road cutting may cause a reduction in baseflow in diverted section of river, but not overall water body. Whereas the diversion may cause a drop in baseflow due to lack of alluvium in new channel, therefore connection with groundwater body is lost. Diversion represents nearly 10% of overall water body. Depending on how much flow is lost, potential minor and localised effect on water quality. Nine sewage discharge consents to Canley Brook and its tributaries. Potential for reduced dilution potential, if a significant amount of flow is lost. Water body is also restricted from attaining Good Ecological status due to current abstraction, hydrology 'does not support good status'. Reducing flow/volume may prevent future good status.	At risk
River Blythe from Temple Balsall Brook to Patrick Bridge	GB104028042571	Biology, phosphate	Cutting - Reduced flow/volume of water	Dewatering - effect on flow	Park Lane cutting and Burton Green retaining wall. Water body is at Moderate for phosphate, dewatering of cutting and retaining wall may reduce baseflows of Bayleys Brook and reduce dilution potential. STW discharge consent on Bayleys Brook.	None
River Blythe from Patrick Bridge to River Tame	GB104028042572	Hydrology, phosphate	Abstraction - uncertain of impact Cutting - Reduced flow/volume of water	Dewatering - effect on flow	Diddington cutting. Water body is at Moderate for phosphate, dewatering of cutting may reduce baseflows of Hollywell Brook and reduce dilution potential. Two discharge consents for STW final effluent on Hollywell Brook. Overall water body (River Blythe) not affected as dewatering discharge is upstream of reach parallel to cutting. Abstractions returned to ground via SuDS or upstream to surface water body (River Blythe). Some potential loss of flow to Hollywell Brook (tributary of Blythe) as a result of drainage in Diddington cutting, however, drainage will be returned into the upstream tributary of the River Blythe, Shadow Brook.	None
River Cole from Hatchford-Kingshurst Brook to River Blythe	GB104028042420	Morphology	RBMP mitigation measures	Beneficial - contribution towards RBMP mitigation measures	The river diversion will result in the creation of an extra 300m of watercourse, with channel and riparian habitats.	Positive
River Tame from Confluence of the	GB104028046840	Morphology	RBMP mitigation	Beneficial - contribution	The proposed new channel of the River Tame is likely to provide a wider range of habitat than the existing channel, notably for macroinvertebrates	Positive

Water body name	Water body ID	Element not achieving 'Good' status	Pressure identified - certainty/confidence	Proposed Scheme relevant impact	Scheme element	Outcome
two arms to River Blythe			Measures	towards RBMP mitigation Measures	and fish. In addition, wetlands areas are going to be created as part of the scheme north of the River Tame.	
Plants Brook Catchment (tributary of Tame)	GB104028046860	Hydrology, morphology	Abstraction - uncertain of impact RBMP mitigation measures	Beneficial - habitat creation	Small river diversion	Positive
River Rea from Bourn Brook to River Tame	GB104028042550	Hydrology, morphology	Abstraction - uncertain of impact RBMP mitigation measures	Beneficial - habitat creation	Small river diversion	Positive
Middleton Hall Catch - tributary of Langley Brook	GB104028046850	Hydrology, morphology	Abstraction - uncertain of impact RBMP mitigation measures	Dewatering - effect on flow	Slight increase in volume as a result of drainage from cutting. May slightly improve rivers dilution capacity.	Positive
Langley Brook from Source to Middleton Hall Catch	GB104028046890	Biology, phosphate	Cutting - Reduced flow/volume of water	Dewatering - effect on flow	Middleton Pool cutting. Water body is at Bad for phosphate, dewatering of cutting may reduce baseflows of spring fed stream and reduce dilution potential. Multiple sewage discharge consents on water body.	At risk
East Litchfield catchment - tributary of Tame	GB104028047020	Hydrology, phosphate	Abstraction - confirmed impact Cutting - Reduced flow/volume of water	Dewatering - effect on flow	Swinfen cutting. Water body is at Poor for phosphate, dewatering of cutting may reduce baseflows of spring fed stream and reduce dilution potential. Five sewage discharge consents on water body. Water body is also restricted from attaining Good Ecological status due to current abstraction, hydrology 'does not support good status'. Reducing flow/volume may prevent future good status.	At risk
Pyford Brook Catchment (tributary of Trent)	GB104028047250	Morphology	RBMP mitigation measures	None	No impact	None

2.6.62 Uncertainty has been included in the identification of impacts and setting alternative objectives, since this is the first planning cycle of the RBMP's and monitoring data and evidence is being gathered. Therefore, a precautionary approach has been taken in this assessment, whereby any identification of an impact will be used to highlight the potential for the Proposed Scheme to prevent the future objective being obtained.

Programme of measures

2.6.63 This assessment has also taken into account the actions (Programme of Measures for RBMP Cycle 1) that are proposed for each sector. Actions for all water bodies affected by the Proposed Scheme were assessed for relevance to the construction and operation of the Proposed Scheme.

2.6.64 Three surface water bodies were deemed to have proposed actions (measures) which have the potential to be affected by the Proposed Scheme.

2.6.65 Further monitoring of the chemical Glyphosate (herbicide) has been proposed by the Environment Agency on the River Blythe (GB104028042572) and River Leam (GB109054044140). The Proposed Scheme will not prevent the proposed monitoring on these water bodies; however, it may contribute towards the content of herbicide within the water body through the spraying of tracks. Track drainage will be discharged via attenuation ponds and SuDS, thereby reducing the amount of herbicide directly entering the watercourses.

2.6.66 Investigations have been proposed at the BAP (Mid Colne - Gade confluence to Denham Green) and SSSI (Mid Colne Lakes (including West Hyde stream)) sites on the River Colne (GB106039023090) perceived to be adversely affected by abstraction. The Proposed Scheme will not prevent the proposed investigations on the River Colne and associated lakes.

Further mitigation of potential risks to surface water body status

2.6.67 Of the 15 water bodies for which there is a potential risk of deterioration, further assessment will be required during detailed design in order to confirm the assessment outcome. Of these amber water bodies, six water bodies (Cherwell (Ashby Brook to Cropredy), Cherwell (Cropredy to Nell Bridge), East Litchfield catchment, Stoke Brook, Radstone Brook and Finham Brook) have no baseline data for the water body or tributaries that will be impacted by the Proposed Scheme. Further baseline data collection will be undertaken in relation to biological and hydromorphological quality elements in order to confirm the assessment. This will be particularly important in confirming the importance of minor tributaries to biological quality elements and their contributions to hydromorphological processes within the main water body.

2.6.68 In most cases the potential risk of deterioration arises from the combined impacts of multiple scheme elements, especially culverts. Further details will be required showing the design of new habitats within a buffer set aside to create resting areas for fish and improve hydromorphological connectivity between the culvert and the up and downstream water body.

2.6.69 Where the potential risk of deterioration to surface water bodies arises from the dewatering impacts on groundwater flows, site specific ground investigation data will be used to determine the impacts more accurately than can be achieved through desk

study at this stage. Where the findings of these investigations confirm that deterioration is likely to occur, further mitigation measures could include altering the design and management of temporary dewatering and discharge areas.

2.6.70 In accordance with the draft CoCP, Section 16, monitoring will be undertaken in consultation the Environment Agency prior to, during and post-construction, if required, to establish baseline conditions for surface water bodies and to confirm the effectiveness of agreed temporary and permanent mitigation measures.

2.7 Groundwater body assessment

2.7.1 The Proposed Scheme has been assessed where it falls within designated groundwater bodies.

2.7.2 Key assumptions regarding the aspects of the Proposed Scheme assessed with respect to WFD status of groundwater include:

- Owing to the scale of the groundwater bodies, only major structures have been considered during the WFD assessment. This includes tunnels, cuttings, embankments, viaducts and stations. Selected other structures that are expected to include significant below ground works have been assessed. Overbridges for major roads (A and B roads) have been assessed. Overbridges for minor roads, bridlepaths and footpaths have not been assessed separately; these are expected to have shallow foundations and relatively small footprints. Culverts and underbridges within embankment structures are expected to only have shallow foundations. Therefore these structures have not been assessed separately to the embankments. New roads and road realignments have been considered but reinstatement of existing roads affected by construction has been discounted.
- The potential impacts associated with general construction activities, such as vehicle movements, wastewater management and storage of materials, have not been explicitly assessed. It is assumed that adoption of best practice site management and compliance with the CoCP will mitigate the potential risks to groundwater.
- The temporary footprint associated with construction compounds and storage areas has not been assessed.

2.7.3 Details of the assessments for each sub-element for quantitative status and chemical status are described in the following.

Quantitative status

2.7.4 The approach used for the assessment of potential impacts on individual WFD elements for quantitative status is presented below.

2.7.5 Key assumptions specific to the assessment of quantitative status include:

- Where possible, groundwater abstracted during construction will be returned to ground via SuDS (usually via attenuation ponds). It is assumed that the majority of abstraction is thus non-consumptive. It is assumed that the location of the SuDS features used for disposal of abstracted groundwater

during construction will be generally similar to those proposed for the permanent condition unless stated otherwise;

- As advised by the Environment Agency, it is assumed that the proposed future changes to the abstraction licensing regime will not consider the passive drainage of an excavation or cutting to be a licensable abstraction. It is noted that the current UKTAG guidance states that abstracted groundwater that has been locally returned to the aquifer or to a river should be discounted from the water balance test;
- Small-scale and short-term abstractions during construction where water is returned to the environment in the immediate vicinity of the point of abstraction have been assumed not to significantly influence regional groundwater resource availability. These include abstractions from within cut-off walls (e.g. ventilation shafts for tunnels), abstractions during piling, and any localised shallow groundwater management required during the construction of shallow foundations or services; and
- All surface water bodies are assumed to be groundwater dependent unless otherwise stated.

Saline or other intrusions

2.7.6 The Proposed Scheme as a whole is relatively shallow. The majority of abstractions will be much less than 50 m deep. Therefore, the Proposed Scheme poses a limited risk of inducing intrusion of saline waters from depth. The Proposed Scheme crosses relatively few areas where there are known regional issues relating to saline or other poor quality waters at shallow depths.

2.7.7 The intrusion of saline waters from coastal waters in the London Basin has been discounted as the Proposed Scheme in central London is not located within a designated groundwater body.

Surface water

2.7.8 Dewatering abstractions and drainage of cuttings can lower groundwater levels. This may influence the flow regime within surface watercourses through a reduction in baseflow or through a reduction in spring flows.

2.7.9 Structures that extend beneath the groundwater table may potentially act as barriers or preferential pathways. Local alterations to the groundwater flow regime may have subsequent consequences for the flow regime in adjacent surface waters.

2.7.10 The impacts of changes to the groundwater flow regime on surface water flows are likely to be most significant during low flow conditions. During dry weather, the proportion of surface run-off inputs will reduce and groundwater will contribute a greater proportion of the total flows.

2.7.11 Changes in flows in surface waters may have a subsequent impact on the aquatic ecology and hydromorphology.

2.7.12 The impacts of groundwater abstraction are assumed to be negligible where the abstracted groundwater is planned to be returned to the subsurface using SuDS or to surface waters within the same part of the surface water catchment.

2.7.13 Potential impacts on surface waters have been allocated to the closest water features except where there are geological constraints that would influence local surface water-groundwater interactions. Similarly, groundwater catchments for surface water bodies are assumed to be the same as the surface water catchment except where there is a geological constraint. The radius of influence for an individual cutting or tunnel has been taken into account when considering if a significant change in spring flows or baseflow is likely to occur; the radius of influence assumptions are aligned with those presented in the water resources assessment appendices (Volume 5: WR-002 appendices). Where surface water features are outside the predicted radius of influence but the design element is within the likely catchment, the potential for influence on baseflow due to changes in recharge patterns has also been taken into account.

2.7.14 Initially, a qualitative assessment of potential effects was undertaken. Where groundwater was predicted to be removed from the catchment of a surface water feature, further semi-quantitative assessment was undertaken. This included comparison of the initial estimates regarding the magnitude of likely groundwater inflows to cuttings or tunnels with initial estimates of flow rates in adjacent surface water bodies under low-flow conditions. No numerical modelling of surface water-groundwater interactions has been undertaken at this stage. The assessment also takes into account the spatial scale of the Proposed Scheme compared to the spatial scale of the groundwater body and status of the surface water body catchments.

2.7.15 It must be noted that there is uncertainty with respect to both the estimates of likely groundwater abstractions and the estimates of low-flow rates in the surface watercourses. The estimates for groundwater flows are influenced by the limitations on the available site-specific data on groundwater levels and local hydraulic properties. The estimates for surface water flows are influenced by the locations of the nearest gauging stations and scale effects; it is recognised that standard hydrological scaling methods do not always provide reliable estimates for smaller tributaries, particularly where these are fed by springs.

2.7.16 The assumptions regarding surface water-groundwater interactions will require review once site-specific intrusive ground investigation including water level and flow monitoring for the Proposed Scheme has been undertaken. In particular, data regarding spring flows and surface water flows in the headwaters and tributaries of the surface water bodies will help verify the conceptual hydrogeological models.

2.7.17 Both designated surface water bodies and ordinary watercourses have been considered as potential receptors for the assessment of impacts at the scale of individual design elements. However, it has been assumed that the overall impact at the groundwater body scale will only be significant if a significant impact (i.e. change in status) is predicted for a designated surface water body.

2.7.18 The groundwater assessment has been undertaken in consultation with the surface water and ecology specialists to determine the likely significance of the predicted effects. The current WFD status of both the groundwater body and surface water body has been taken into account.

Groundwater dependent terrestrial ecosystems

2.7.19 The potential GWDTE considered in the assessment include designated statutory and non-statutory sites plus non-designated ecological habitats identified through the EIA process. Potential groundwater dependency has been assumed based on the available hydrogeological and ecological evidence. The assumptions regarding groundwater dependency of individual habitats will require review once site-specific investigation including water and ecological monitoring for the Proposed Scheme has been undertaken.

2.7.20 The loss of GWDTE locally due to land required for the construction or operation of the Proposed Scheme is discounted when assessing groundwater body status. Instead, this issue is considered in the EIA process.

2.7.21 The assessment is predominantly qualitative. The radius of influence for an individual cutting or tunnel has been taken into account when considering if a significant change in water levels is likely to occur; the radius of influence assumptions are aligned with those presented in the ES. Where GWDTE features are within 1km of the design element but outside the predicted radius of influence, the potential for influence of the local hydraulic regime due to changes in recharge or groundwater flow patterns has also been taken into account.

2.7.22 All identified potential GWDTE have been considered as potential receptors for the assessment of impacts at the scale of individual design elements. However, to align with the Environment Agency's current WFD assessment methodology, it has been assumed that the overall impact at the groundwater body scale will only be significant if a significant impact is predicted at a designated statutory site that is a classified as a GWDTE. The Environment Agency provided a list of SSSI that are considered to be GWDTE for the purposes of WFD groundwater body assessments.

2.7.23 The groundwater assessment has been undertaken in consultation with the ecology specialists to determine the likely significance of the predicted effects.

Water balance

2.7.24 The sustainable rate of combined total abstraction from a groundwater body is less than the estimated recharge rate minus the water required to support ecological flow requirements. When the total groundwater abstraction from a groundwater body is greater than the predicted recharge to the groundwater body, this can cause reduction in groundwater levels.

2.7.25 The majority of the abstractions for the Proposed Scheme are considered to be effectively non-consumptive with the water remaining within the local environment. Key risks to the water balance of individual groundwater bodies are assumed to occur where abstracted groundwater will be discharged back to ground within a different groundwater body or where the water will be discharge to surface waters rather than to ground. It is noted that the current UKTAG guidance states that abstracted groundwater that has been locally returned to the aquifer or to a river should be discounted from the water balance test.

2.7.26 The water balance assessment is semi-quantitative. The impact on the water balance is assumed to be negligible where the abstracted groundwater is planned to be

returned to the subsurface using SuDS within the same groundwater body. Where groundwater is not planned to be returned to the same groundwater body using SuDS, potential dewatering rates have been estimated. The current estimates use the same permeability and drawdown assumptions as were used in the ES for the radius of influence calculations. These dewatering estimates will require review once site-specific intrusive ground investigation and groundwater level monitoring for the Proposed Scheme has been undertaken.

2.7.27 The current WFD status of the groundwater body has been taken into account. Current water balance data regarding recharge, environmental requirements and current abstractions (licensed and actual) provided by the Environment Agency have been utilised in the assessment of significance. A comparison has been made between the estimated total rate of dewatering and the available water balance capacity within the groundwater body. For conservatism, all groundwater abstractions within a groundwater body are assumed to occur concurrently; in reality, construction dewatering requirements will vary over time.

2.7.28 Using SuDS such as attenuation ponds for storm water drainage may be beneficial to the water balance by locally enhancing recharge to groundwater. However, to be conservative, the infiltration of storm water has been discounted from the assessment.

2.7.29 Risks associated with water availability at existing abstractions are dealt with via the EIA process and is assumed not to affect groundwater body status for the water balance test.

Chemical status

2.7.30 The approach used for the assessment of potential impacts on individual WFD elements for chemical status is presented below.

2.7.31 Key assumptions specific to the assessment of chemical status include:

- groundwater within designated DrWPAs is a potential potable resource. This discounts the local influence of existing contamination pressures when assessing the sensitivity of the receptors;
- all surface water bodies are assumed to be groundwater dependent unless otherwise stated; and
- the potential consequences of unplanned catastrophic incidents have not been explicitly considered. It is assumed that these would be dealt with via the environmental management and contingency planning process.

Saline or other intrusions

2.7.32 The methodology adopted is the same as that used for the assessment of saline intrusions with respect to quantitative status.

Surface water

2.7.33 Changes to the proportion of baseflow entering a surface watercourse may have consequences for surface water chemistry. There may be an influence on natural hydrochemistry factors such as alkalinity. Contaminant concentrations in the surface

water course may be influenced due to changes in dilution and mixing. A reduction in baseflow would normally be anticipated to have an adverse impact on surface water quality but occasionally there may be a beneficial impact where groundwater is more contaminated than surface waters.

2.7.34 The Proposed Scheme may also create new or enhanced preferential pathways for contaminant migration from groundwater to surface water.

2.7.35 Changes in water quality in surface waters may have a subsequent impact on the aquatic ecology.

2.7.36 The findings of the assessment for quantitative status with respect to surface waters (described above) were used to inform the assessment of chemical status.

2.7.37 The assessment is predominantly qualitative. No numerical modelling of surface water-groundwater interactions or of hydrochemistry has been undertaken at this stage. The assumptions regarding surface water-groundwater interactions will require review once site-specific intrusive ground investigation including water quality monitoring for the Proposed Scheme has been undertaken.

2.7.38 Both designated surface water bodies and ordinary watercourses have been considered as potential receptors for the assessment of impacts at the scale of individual design elements. Again, it has been assumed that the overall impact at the groundwater body scale will only be significant if a significant impact (i.e. change in status) is predicted for a designated surface water body.

2.7.39 The groundwater assessment has been undertaken in consultation with the surface water and ecology specialists to determine the likely significance of the predicted effects. The current WFD status of both the groundwater body and surface water body has been taken into account.

Groundwater dependent terrestrial ecosystems

2.7.40 Changes to the groundwater flows entering a GWDTE may have consequences for groundwater chemistry at the GWDTE. There may be an influence on natural hydrochemistry factors such as alkalinity. Contaminant concentrations may be influenced due to changes in dilution and mixing.

2.7.41 The Proposed Scheme may also create new or enhanced preferential pathways for contaminant migration from groundwater to nearby GWDTE.

2.7.42 The findings of the assessment for quantitative status with respect to GWDTE (described above) were used to inform the assessment of chemical status. The same set of GWDTE were assessed for chemical status as had been considered during the assessment of quantitative status.

2.7.43 The assessment is qualitative. No numerical modelling of groundwater chemistry has been undertaken at this stage. The assumptions regarding groundwater quality pressures on individual habitats will require review once site-specific investigation including water and ecological monitoring for the Proposed Scheme has been undertaken.

2.7.44 All identified potential GWDTE have been considered as potential receptors for the assessment of impacts at the scale of individual design elements. Again, to align with the Environment Agency's current WFD assessment methodology, it has been assumed that the overall impact at the groundwater body scale will only be significant if a significant impact is predicted at a designated statutory site that is a classified as a GWDTE.

2.7.45 The groundwater assessment has been undertaken in consultation with the ecology specialists to determine the likely significance of the predicted effects.

Drinking water protected areas

2.7.46 Dewatering abstractions may induce the migration of existing poor quality groundwater.

2.7.47 The Proposed Scheme may also create new or enhanced preferential pathways for contaminant migration between or within aquifers.

2.7.48 The groundwater is considered to be of greater sensitivity where the aquifer has been designated by the Environment Agency as a Drinking Water Protected Area (DrWPA).

2.7.49 All groundwater abstractions with designated source protection zone (SPZ) are considered to be of strategic importance. The groundwater receptor is considered to be of greater sensitivity where the site falls within a designated SPZ. On the advice of the Environment Agency, the mapped SPZ boundaries have been considered as indicative only owing to temporal and spatial fluctuations in actual abstraction rates.

2.7.50 It has been assumed that the overall impact at the groundwater body scale will only be significant if a significant impact is predicted on a strategically important potable abstraction. Any potential impacts on water quality at other individual abstractions are dealt with primarily via the EIA process and are assumed not to affect groundwater body status.

2.7.51 The assessment is predominantly qualitative. No numerical modelling of regional groundwater quality was undertaken at this stage. The assumptions regarding risks to individual strategic potable abstractions will require review once site-specific intrusive ground investigation and monitoring for the Proposed Scheme has been undertaken.

General water quality

2.7.52 Dewatering abstractions may induce the migration of existing poor quality groundwater.

2.7.53 The Proposed Scheme may also create new or enhanced preferential pathways for contaminant migration between or within aquifers.

2.7.54 The assessment of risks to general water quality takes into account the aquifer type and the depth to groundwater beneath the Proposed Scheme. It also takes into account the spatial scale of the Proposed Scheme compared to the spatial scale of the groundwater body.

2.7.55 Where groundwater bodies are currently at 'Poor' status due to mine waters or nutrients, it is considered unlikely that the Proposed Scheme will significantly affect this status.

2.7.56 The assessment is qualitative. No numerical modelling of regional groundwater quality was considered necessary at this stage. The assumptions regarding risks to general water quality will require review once site-specific intrusive ground investigation and monitoring for the Proposed Scheme has been undertaken.

Groundwater body assessment findings

2.7.57 The results of the assessment process for the groundwater bodies are presented in full in Annex B.

2.7.58 The majority of the Proposed Scheme is predicted to result in local or temporary effects that are considered unlikely to affect WFD status at the groundwater body scale. However, potential risks to individual WFD elements have been identified for a number of the groundwater bodies.

2.7.59 On the basis of the current information and assumptions, the overall WFD assessment concluded that no groundwater bodies would definitely change from 'Good' to 'Poor' status or experience significant deterioration where already at Poor status as a result of the Proposed Scheme, i.e. no groundwater bodies were ranked overall as red.

2.7.60 A summary of the overall results for quantitative and chemical status for each groundwater body is presented in Table 17.

2.7.61 However, several of the groundwater bodies were identified as being at risk, i.e. were ranked overall as amber. Eight of the 15 groundwater bodies were identified as being at potential risk for quantitative elements. Three of the 15 groundwater bodies were identified as being at potential risk for chemical elements.

2.7.62 A summary of the key risks to quantitative and chemical status is presented in Table 18.

2.7.63 For Mid-Chilterns Chalk, a significant residual risk to the DrWPA element has been identified owing to the proximity of the Proposed Scheme to existing public water supply abstractions. Further mitigation measures are under discussion with the Environment Agency in consultation with Affinity Water Ltd. These are discussed in the 'Other mitigation measures' sections in the relevant CFA reports (CFA 6, 7, 8 and 9) and are also set out in the route-wide effects report (Volume 3). Until the mitigation has been agreed and assessed by all parties, there remains the risk of WFD deterioration with respect to the DrWPA WFD element for chemical status. In developing the management strategy for the PWS abstractions (see Volume 3, Section 15), due regard will be given to Catchment Abstraction Management Strategies, the relevant RBMP and the requirements of any necessary consents or approvals.

2.7.64 For the remaining groundwater bodies where risks were identified, it was considered unlikely that a deterioration in status would occur. However, to reflect the identified risks, these groundwater bodies remain at Amber to distinguish from those assessed as Yellow or Green. No design elements were considered likely to prevent implementation of the measures identified in a RBMP to achieve future good status. However, the influence of the Proposed Scheme on quantitative status of surface waters and water balance would need to be taken into account in future catchment or groundwater body scale studies and investigations of abstraction pressures.

Table 17: Summary of findings of groundwater body assessment

Groundwater body	CFA	Quantitative status			Chemical status		
		Current	Prediction	Comments	Current	Prediction	Comments
Radlett Tertiaries	5, 6, 7, 8	Poor	No significant deterioration	No significant effects identified	Poor	No significant deterioration	Local, minor or temporary effects
Mid-Chiltern Chalk	7, 8, 9, 10	Poor	No significant deterioration	Local, minor or temporary effects	Good	Remains at Good status subject to Environment Agency approval of mitigation measures	Risks identified with respect to: DrWPAs
Chiltern Chalk Scarp	10, 11	Poor	No significant deterioration	Risks identified with respect to: Surface waters GWDTE Water balance	Good	Remains at Good status	Local, minor or temporary effects
Headington Corallian	11, 12	Good	Remains at Good status	No significant effects identified	Good	Remains at Good status	No significant effects identified
Upper Bedford Ouse Oolite Secondary	13, 14, 15	Good	Remains at Good status	Local, minor or temporary effects	Good	Remains at Good status	Local, minor or temporary effects
Upper Bedford Ouse Oolite Principal 1	13, 14, 15	Good	Remains at Good status	Risks identified with respect to: Surface waters GWDTE	Poor	No significant deterioration	Local, minor or temporary effects
Byfield Jurassic	15	Good	Remains at Good status	Risks identified with respect to: Surface waters GWDTE	Good	Remains at Good status	Local, minor or temporary effects

Groundwater body	CFA	Quantitative status			Chemical status		
		Current	Prediction	Comments	Current	Prediction	Comments
				Water balance			
Banbury Jurassic	15, 16	Good	Remains Good status	Local, minor or temporary effects	Good	Remains Good status	Local, minor or temporary effects
Warwickshire Avon Secondary Mudrocks	16, 17, 18	Good	Remains Good status	Local, minor or temporary effects	Good	Remains Good status	Local, minor or temporary effects
Warwickshire Avon Permo-Triassic Sandstone Warwick Avon (Confined)	17, 18	Poor	No significant deterioration	Risks identified with respect to: Water balance	Good	Remains Good status	Local, minor or temporary effects
Warwickshire Avon Coal Measures Coventry	17, 18, 23	Poor	No significant deterioration	Risks identified with respect to: Surface waters Water balance	Poor	No significant deterioration	Local, minor or temporary effects
Tame Anker Mease Permo-Triassic Sandstone Nuneaton & Meriden	21, 22, 23	Good	Remains at Good status	Risks identified with respect to: GWDTE Water balance	Good	Remains at Good status	Risks identified with respect to: GWDTE
Tame Anker Mease Secondary Combined	19, 20, 21, 22, 23, 24, 25, 26	Good	Remains at Good status	Risks identified with respect to: Surface waters GWDTE	Poor	No significant deterioration	Risks identified with respect to: Surface waters GWDTE
Tame Anker Mease Permo-Triassic Sandstone Birmingham Lichfield	21, 22, 26	Poor	No significant deterioration	Risks identified with respect to: Surface waters Water balance	Poor	No significant deterioration	Local, minor or temporary effects

Groundwater body	CFA	Quantitative status			Chemical status		
		Current	Prediction	Comments	Current	Prediction	Comments
Staffordshire Trent Valley Mercia Mudstone East & Coal Measures	22	Good	Remains at Good status	Local, minor or temporary effects	Good	Remains at Good status	Local, minor or temporary effects

Table 18: Summary of key risks to groundwater body status

Groundwater body	CFA	Quantitative status		Chemical status	
		WFD element	Comments	WFD element	Comments
Mid-Chilterns Chalk	7, 8, 9, 10	-	-	DrWPAs	Sub-water table activities planned within SPZ and near to private abstractions. Landfills and existing poor quality groundwater in the vicinity. Tunnelling, shaft construction and piling have potential for moderate impact on groundwater quality at nearby PWS / SPZ due to migration of fluids and turbidity during construction. Mitigated through CoCP and best practice for design, construction and operation. Temporary change in groundwater quality predicted during construction. . Further mitigation measures are under discussion with the Environment Agency in consultation with Affinity Water Ltd. Until management measures are agreed with Environment Agency the ES identifies a significant residual effect on groundwater. In developing the management strategy for the PWS abstractions (see Volume 3, Section 15.4), due regard will be given to Catchment Abstraction Management Strategies, the relevant RBMP and the requirements of any necessary consents or approvals.

Groundwater body	CFA	Quantitative status		Chemical status	
		WFD element	Comments	WFD element	Comments
Chiltern Chalk Scarp	10, 11	Surface waters	Wendover North Cutting will have an impact on Stoke Brook due to potential reduction in spring flows. Water returned to surface water downstream but about 1km of headwaters may be affected. Impacts on headwaters may have ecological consequences on the brook. Majority of Stoke Brook downstream of discharge point is on unproductive strata so brook catchment as a whole is probably surface-water dominated. No overall loss of groundwater from the surface water catchment. There may be minor losses of groundwater to the Stoke Brook but ES suggests infiltration trenches to recharge groundwater as mitigation (see Volume 2 CFA10 Section 13.4). Taking into account scale effects, this is not considered likely to cause a deterioration in groundwater body status. Additionally, Wendover Green Tunnel will have a temporary impact on headwaters of Wendover Brook due to potential reduction in spring flows during construction, affecting about 1km of the tributary. This impact will reduce once construction is complete.	-	-

Groundwater body	CFA	Quantitative status		Chemical status	
		WFD element	**Comments**	**WFD element**	**Comments**
		GWDTE	GWDTE at World's End LWS predicted to be adversely affected by Wendover North Cutting. Spring flow may be reduced and discharge of groundwater from cutting will be downstream of the GWDTE. This will have ecological consequences for the GWDTE. However, the GWDTE is not a statutory site and thus it is considered unlikely that this would cause failure of the WFD element under the current Environment Agency methodology. Additionally, Wendover Green Tunnel will have a temporary impact on headwaters of Wendover Brook due to potential reduction in spring flows during construction. Downstream on Wendover Brook is Turville Reservoir SSSI GWDTE. However, the springs likely to be affected by tunnel feed a tributary that bypasses the reservoir except during high flow events (see Volume 5 Appendix WR-001-010). Therefore, ES concluded no significant impact on SSSI and it is considered that failure of the WFD element would be unlikely.	-	-
		Water balance	Wendover North Cutting will have a local impact on the water balance and will locally lower water levels. Water is expected to be returned to surface waters at the edge of the groundwater body, or to groundwater in the vicinity of the cutting (see Volume 2, CFA10, Section 13.4). During construction of Wendover Green Tunnel, this will also apply due to dewatering. Current water balance is at Poor status. The removal of groundwater poses a risk to the local availability of groundwater resources. However, assuming that passive drainage is not considered as licensable abstraction and given that the water is returned to the water environment in proximity to where it is removed, it is considered unlikely that the deterioration would be considered significant at the scale of the water body under the current Environment Agency classification methodology.	-	-

Groundwater body	CFA	Quantitative status		Chemical status	
		WFD element	Comments	WFD element	Comments
Upper Bedford Ouse Oolite Principal 1	13, 14, 15	Surface waters	Local or temporary impacts predicted. Mitigated through discharge of water back to ground via SuDS where possible or to surface waters. However, combined impacts of all design elements, particularly Brackley South Cutting and Greatworth South Cutting, have the potential to have an adverse effect on the catchments of Radstone Brook and Ouse with potential ecological consequences. Interaction between Upper Bedford Ouse Oolite Principal and Secondary groundwater bodies requires consideration. Taking into account scale effects, this is not considered likely to cause a deterioration in groundwater body status.	-	-

Groundwater body	CFA	Quantitative status		Chemical status	
		WFD element	**Comments**	**WFD element**	**Comments**
		GWDTE	Local effects predicted at Turweston Manor Carr LWS GWDTE due to Turweston Cutting and Turweston Viaduct. Mitigated through discharge of water back to ground via SuDS where possible. Interaction between Upper Bedford Ouse Oolite Principal and Secondary groundwater bodies requires consideration. No significant impacts have been predicted at Turweston Manor Carr LWS (see Volume 5, CFA 14, Section 5.2). Additional minor impacts due to the Turweston Cutting are possible at Turweston Carr & Wetland due to changes in the local hydrogeological regime. Although the potential GWDTE is not within the predicted radius of influence of the cutting, the cutting may influence the local flow regime through intersection of the layered aquifer system. However, the cutting does not intersect the entire aquifer system (see Volume 5, CFA 14, Section 5.2). None of these GWDTE near Turweston are statutory sites and thus it is considered unlikely that this would cause failure of the WFD element under the current Environment Agency methodology. Local effects at Helmdon Disused Railway SSSI predicted due to Brackley South Cutting. Only sections of the SSSI that are already in existing cuttings would be influenced; no impact is predicted in those areas of the SSSI that are on an existing embankment. However, the species designated as important features of the SSSI are not considered to be dependent on groundwater (see Volume 5, CFA 14, Section 5.2). Thus it is considered unlikely that this would cause failure of the WFD element under the current Environment Agency methodology.	-	-

Groundwater body	CFA	Quantitative status		Chemical status	
		WFD element	Comments	WFD element	Comments
Byfield Jurassic	15	Surface waters	Local or temporary impacts predicted. Mitigated through discharge of water back to ground via SuDS where possible or to surface waters. Individual cuttings are not expected to have significant effects at scale of designated surface water body. Local effects may occur, particularly in headwaters and tributaries of River Cherwell. However, combined impacts of all design elements have the potential to have an adverse effect on the catchment of River Cherwell with potential ecological consequences. Taking into account scale effects, this is not considered likely to cause a deterioration in groundwater body status due to the design measures to return groundwater to ground or surface water courses.	-	-
		GWDTE	Local effects predicted on undesignated GWDTE at Costow House due to Thorpe Mandeville Cutting. Spring flow may be reduced and discharge of groundwater from cutting will be downstream of the GWDTE. This GWDTE is not a statutory site and thus it is considered unlikely that this would cause failure of the WFD element under the current Environment Agency methodology.	-	-
		Water balance	Local or temporary impacts predicted. Mitigated through discharge of water back to ground via SuDS where possible. Cuttings will locally lower groundwater levels. Combined impacts from cuttings have the potential to have an adverse effect on water balance as some groundwater being discharged to surface waters or to adjacent groundwater body (Banbury Jurassic). Current water balance for GWB is at Good status but has limited spare capacity. However, assuming that passive drainage is not considered as licensable abstraction, it is considered unlikely that failure of the WFD element would occur under the current Environment Agency classification methodology.	-	-

Groundwater body	CFA	Quantitative status		Chemical status	
		WFD element	Comments	WFD element	Comments
Warwickshire Avon Permo-Triassic Sandstone Warwick Avon (Confined)	17, 18	Water balance	Drainage of Stonehouse Cutting will transfer groundwater into adjacent groundwater body (Warwickshire Avon Coal Measures Coventry). Cutting will locally lower groundwater levels. Current water balance is at Poor status. Groundwater body is relatively small so there is limited capacity to absorb abstraction impacts. However, assuming that passive drainage is not considered as licensable abstraction, it is considered unlikely that the potential deterioration would be considered significant under the current Environment Agency classification methodology.	-	-
Warwickshire Avon Coal Measures Coventry	17, 18, 23	Surface waters	Local or temporary impacts predicted. Mitigated through discharge of water back to ground via SuDS where possible or to surface waters. Individual cuttings are not expected to have significant effects at scale of designated surface water bodies. Local effects may occur, particularly in headwaters and tributaries. However, combined impacts of all design elements have the potential to have an adverse effect on the catchments of Canley Brook and Finham Brook, which are already unable to support Good ecological potential due to abstraction pressures on flows. Taking into account scale effects, this is not considered likely to cause a deterioration in groundwater body status.	-	-
		Water balance	Local or temporary impacts predicted. Cuttings will locally lower groundwater levels. However, combined impacts of all design elements have the potential to have an adverse effect on the water balance taking into account existing Poor status. Mitigated through discharge of water back to ground via SuDS where possible. However, assuming that passive drainage is not considered as licensable abstraction, it is considered unlikely that the deterioration would be considered significant under the current Environment Agency classification methodology.	-	-

Groundwater body	CFA	Quantitative status		Chemical status	
		WFD element	Comments	WFD element	Comments
Tame Anker Mease Permo-Triassic Sandstone Nuneaton & Meriden	21, 22, 23	GWDTE	Park Lane Cutting is close to Berkswell Marsh SSSI GWDTE. Other GWDTE in vicinity. Potential for cutting drainage to influence hydraulic regime at SSSI. Mitigated through drainage design and discharge of water back to ground via SuDS. Therefore, ES concluded no significant impact on the SSSI (see Volume 5, CFA 23), and thus groundwater body status, but monitoring is required to confirm.	GWDTE	Park Lane Cutting is close to Berkswell Marsh SSSI GWDTE. Other GWDTE in vicinity. Berkswell Marsh SSSI is considered sensitive to pesticides. Landfills close to cutting so may be existing poor quality groundwater. Potential for migration of poor quality groundwater via cutting drainage & SuDS. Mitigated through CoCP and best practice for design, construction and operations. No significant residual impacts post-mitigation predicted (see Volume 5, CFA 23), and thus groundwater body status is unlikely to be affected, but monitoring required to confirm
		Water balance	Drainage of Park Lane Cutting will transfer groundwater into adjacent groundwater body (Tame Anker Mease Secondary Combined). Current water balance is at Good status but there is limited spare capacity. Cutting will locally lower water table. However, assuming that passive drainage is not considered as licensable abstraction, it is considered unlikely that failure of the WFD element would occur under the current Environment Agency classification methodology.	-	-
Tame Anker Mease Secondary Combined	19, 20, 21, 22, 23, 24, 25, 26	Surface waters	Local or temporary impacts predicted. No individual design element is considered to pose a significant risk to groundwater body status. However, combined impacts of all design elements have the potential to effect on Tame and Blythe. On Blythe, impacts are predicted to be on tributaries rather than main water body. Mitigated through discharge of water back to ground via SuDS where possible or to surface waters. Taking into account scale effects, this is not considered likely to cause a deterioration in groundwater body status. No significant residual impacts post-mitigation predicted but monitoring is required to confirm.	Surface waters	Local or temporary impacts predicted. No individual design element is considered to pose a significant risk to groundwater body status. However, combined impacts of all design elements have the potential to affect the Tame and Blythe. There are existing water quality issues in groundwater body. Sub-water table activities, particularly related to the Bromford Tunnel, are occurring immediately adjacent to surface water bodies. Mitigated through CoCP and best practice for design, construction and operations. Taking into account scale effects, this is not considered likely to cause a deterioration in groundwater body status. No significant residual impacts post-mitigation predicted but monitoring is required to confirm.

Groundwater body	CFA	Quantitative status		Chemical status	
		WFD element	**Comments**	**WFD element**	**Comments**
		GWDTE	Local or temporary impacts predicted. However, combined impacts of all design elements have the potential to have an adverse effect at groundwater body scale. Scheme elements cross or are close to River Blythe SSSI GWDTE and Coleshill & Bannerly Pools SSSI GWDTE as well as various other LWS GWDTE and potential GWDTE. On Blythe, impacts are predicted to be on tributaries rather than main water body. Mitigated through discharge of water back to ground via SuDS where possible. No significant residual impacts post-mitigation predicted but monitoring is required to confirm.	GWDTE	Local or temporary impacts predicted. However, combined impacts of all design elements have the potential to have an adverse effect at groundwater body scale. Scheme elements cross or are close to River Blythe SSSI GWDTE and Coleshill & Bannerly Pools SSSI GWDTE as well as various other LWS GWDTE and potential GWDTE. Existing water quality issues in groundwater body. Mitigated through CoCP and best practice for design, construction and operations. No significant residual impacts post-mitigation predicted but monitoring is required to confirm.
Tame Anker Mease Permo-Triassic Sandstone Birmingham Lichfield	21, 22, 26	Surface waters	Predominantly local or temporary or other minor effects. However, Swinfen Hall Cutting will have potential adverse impact on East Litchfield Catchment, which is already unable to support Good ecological potential due to abstraction pressures on flows. Partially mitigated through discharge of water back to ground via SuDS but there will be a residual minor influence on the headwaters and on catchment geometry due to the presence of the cutting. Taking into account scale effects, this is not considered likely to cause a deterioration in groundwater body status.	-	-
		Water balance	Local or temporary impacts predicted. No individual design element is considered to pose a significant risk to groundwater body status. However, combined impacts of all design elements have the potential to have an adverse effect on the water balance taking into account existing abstraction pressures (current Poor status). Mitigated through discharge of water back to ground via SuDS where possible. However, assuming that passive drainage is not considered as licensable abstraction and taking into account scale effects, it is considered unlikely that the deterioration would be considered significant under the current Environment Agency classification methodology.	-	-

Further mitigation of risks to groundwater body status

2.7.65 Although no groundwater bodies are currently predicted to change WFD status or experience significant deterioration, potential risks to groundwater body status have been identified for several of the groundwater bodies. Therefore, further work is required to manage these risks.

2.7.66 Further mitigation measures for the Mid-Chilterns Chalk groundwater body are under discussion with the Environment Agency in consultation with Affinity Water Ltd. These are discussed in the 'Other mitigation measures' section in the relevant CFA reports (CFA 6, 7, 8 and 9). This is also set out in the route-wide effects report (Volume 3,Section 15).

2.7.67 The WFD assessment has been based primarily on desk study information. In many areas, due to the lack of site-specific ground investigation or monitoring data, there is residual uncertainty regarding hydrogeological characteristics. Further assessment of the risk to WFD status will be undertaken during the detailed design process once site-specific ground investigation and monitoring data is available. Key areas that will be addressed during the investigation and monitoring process include:

- detailed characterisation of ground conditions;
- measurement of site-specific hydraulic properties;
- site-specific monitoring of groundwater levels and quality;
- monitoring of spring flows;
- monitoring of surface water flows and quality;
- ecological assessment and monitoring, particularly for GWDTE; and
- characterisation of existing contamination.

2.7.68 Further mitigation of the risks will be undertaken where possible during the detailed design process and finalisation of the construction methodologies. The detailed design will take into account local ground conditions and sensitive environmental receptors. Areas where additional mitigation may be possible include the design and management of temporary dewatering during construction and the design of individual SuDS features to optimise groundwater recharge without causing significant risks to groundwater quality.

2.7.69 In accordance with the draft CoCP, Section 16, monitoring will be undertaken in consultation the Environment Agency prior to, during and post-construction, if required, to establish baseline conditions for surface water and groundwater and to confirm the effectiveness of agreed temporary and permanent mitigation measures.

2.8 Conclusions

Assessment methodology

2.8.1 An assessment of the effects from the Proposed Scheme on objectives under the Water Framework Directive was undertaken. Although no published methodology

exists for WFD assessment, the approach adopted for the assessment of the Proposed Scheme is based on internal guidance from the Environment Agency and was agreed at stages throughout the process. The assessment is based on the baseline information available at the time the assessment was prepared.

2.8.2 The assessment takes into account the mitigation built into the design for the Proposed Scheme. In addition, the mitigation measures identified in the water resources and ecology appendices (Volume 5) have been taken into account in the WFD assessments.

Surface water

2.8.3 The WFD surface water assessment is based on existing surface water body status information provided by the Environment Agency, and on ecological and river habitat survey baseline data collected for the EIA.

2.8.4 The assessment considered effects on water bodies which lie within the Proposed Scheme boundary, and those which lie up and downstream for which there is a potential risk of impacts. The scope and the assessment methodology were agreed with the Environment Agency.

2.8.5 The assessment has been undertaken on a precautionary basis given that the baseline data was not available for all the affected water bodies and tributaries, and that the detailed design will be will be taken forward after the Hybrid Bill has been enacted.

2.8.6 Of the 60 surface water bodies affected by the Proposed Scheme, 45 water bodies were considered to have either minor effects or no effects likely to result in deterioration of any of the quality elements.

2.8.7 The remaining 15 surface water bodies were considered to be at potential risk of deterioration as a result of effects on one or more of the quality elements. Of these, 11 water bodies are considered unlikely to experience deterioration in status or potential.

2.8.8 The risk of deterioration in status or potential was considered to be higher for four water bodies. These water bodies are the River Blythe (from Patrick Bridge to the River Tame), River Ouse (GB105033037880), Stoke Brook and Padbury Brook (The Twins).

2.8.9 Combined hydromorphological and biological effects were considered to give rise to a potential risk of deterioration in two of the four water bodies (Stoke Brook, and Padbury Brook (The Twins)). In both cases, river diversions, and/or culverting would occur on significant lengths of the water body or its major tributaries. Whilst the design aim for river diversions is to ensure that the existing hydromorphological regime is maintained, where the diversion is considered to increase the length of the water body there is a risk of reducing flow rates and disrupting stream processes. It is recognised that diversions also offer opportunities for habitat enhancement. Further refinement of the design of the diversions will be undertaken.

2.8.10 Similarly, long culverts (for example, temporary and permanent culverts on the Padbury Brook) have the potential to disrupt stream processes and continuity. In the case of the Padbury Brook, macroinvertebrates are at good status and fish are at high

status, and are therefore considered to be sensitive receptors. For the Stoke Brook the status of the biological receptors is unknown and therefore a precautionary approach has been adopted.

2.8.11 For the River Blythe (Patrick Bridge to River Tame) there would be localised impacts from culverts on tributaries of the Blythe including the Holywell Brook, Shadow Brook and un-named tributary. Although there would be enhancements to the water body from the removal of culverts and associated river diversions, there would also be dewatering impacts from the Diddington cutting on the Holywell Brook and cumulative impacts with the upstream River Blythe water body (Temple Balsall Brook to Patrick bridge) (GB104028042571). Baseline surveys will be undertaken to determine the value of these tributaries for fish. Monitoring of groundwater levels will be undertaken to further inform the dewatering assessment and additional mitigation measures identified.

2.8.12 For the River Ouse (GB105033037880) effects could arise from potentially permanent flow reductions on a major tributary as a result of dewatering of the Brackley South cutting. Whilst effects on the River Ouse itself would be minimal since water would be returned to the river, given the high status of fish in the River Ouse and the lack of certainty over the value of the tributary for migratory fish, a precautionary approach has been adopted. Monitoring of groundwater levels will be undertaken to further inform the assessment of dewatering and additional mitigation measures identified.

2.8.13 For the 11 water bodies where potential risks have been identified but deterioration in status or potential is unlikely, effects arise primarily from impacts to tributaries for which there is no ecological baseline data. A precautionary approach has therefore been adopted by grading these as amber. Further survey may allow these assessments to be moved to a lower impact category.

2.8.14 WFD status and compliance will be informed by further surveys and monitoring as the Proposed Scheme design develops.

Groundwater

2.8.15 The Proposed Scheme crosses 15 groundwater bodies.

2.8.16 The effects of the construction and operation of the Proposed Scheme on these groundwater bodies have been assessed with respect to both chemical and quantitative status.

2.8.17 The majority of the Proposed Scheme is predicted to result in local or temporary effects that are considered unlikely to affect WFD status at the groundwater body scale. However, potential risks to individual WFD elements have been identified for a number of the groundwater bodies.

2.8.18 On the basis of the current information and assumptions, the WFD assessment concluded that no groundwater bodies would change from 'Good' to 'Poor' status or experience significant deterioration where already at 'Poor' status, as a result of the Proposed Scheme.

2.8.19 Eight of the 15 groundwater bodies were identified as being at potential risk for quantitative elements. Three of the 15 groundwater bodies were identified as being at potential risk for chemical elements. This may be considered analogous to being at 'Good' status with 'Low' confidence or, in the case of groundwater WFD elements already at 'Poor' status, it is considered to be non-significant deterioration.

2.8.20 For Mid-Chilterns Chalk, a significant residual risk to the DrWPA element has been identified owing to the proximity of the Proposed Scheme to existing public water supply abstractions. Further mitigation measures are under discussion with the Environment Agency in consultation with Affinity Water Ltd. These are discussed in the 'Other mitigation measures' section in the relevant CFA reports (CFA 6, 7, 8 and 9). In developing the management strategy for the PWS abstractions, due regard will be given to Catchment Abstraction Management Strategies, the relevant RBMP and the requirements of any necessary consents or approvals. Until the mitigation has been agreed and assessed by all parties, there remains the risk of WFD deterioration with respect to the DrWPA WFD element for chemical status of the Mid-Chilterns Chalk groundwater body.

2.8.21 For the remaining groundwater bodies where risks were identified, there are uncertainties due to the limitations of the baseline dataset. A precautionary approach has therefore been adopted when grading these as amber but deterioration in status is considered to be unlikely. Further survey may allow these assessments to be moved to a lower impact category.

Compliance

2.8.22 The WFD assessment provides an indication of the likely compliance of the scheme at the time the assessment was prepared. It is based on the Proposed Scheme design, incorporated mitigation measures and on the current status of 60 surface water bodies and 15 groundwater bodies.

2.8.23 The assessment concluded that the Proposed Scheme will not prevent future attainment of good status or potential where not already achieved.

2.8.24 The assessment concluded that 45 surface water bodies and six groundwater bodies will not experience any deterioration in current status or potential.

2.8.25 For 15 surface water bodies and nine groundwater bodies there is considered to be a risk of deterioration. For 11 surface water bodies and eight groundwater bodies the risk of deterioration in status is considered to be low.

2.8.26 For the remaining four surface water bodies and one groundwater body there is a higher risk of deterioration in current status or potential despite mitigation measures identified in the CFA reports. These particular water bodies are discussed above.

2.8.27 Where the failure to prevent deterioration in the status of a body of surface water or groundwater is the result of new modifications to the physical characteristics of a surface water body or alterations to the level of bodies of groundwater, there will be no breach of the WFD where:

- all practicable steps are taken to mitigate the adverse impact on the status of

the body of water;

- the reasons for those modifications or alterations are specifically set out and explained in the RBMP;
- the reasons for those modifications or alterations are of overriding public interest and/or the benefits to the environment and to society of achieving the objectives set out in Article 4.1 of the WFD are outweighed by the benefits of the new modifications or alterations to (among other things) sustainable development; and
- the beneficial objectives served by those modifications or alterations of the water body cannot for reasons of technical feasibility or disproportionate cost be achieved by other means, which are a significantly better environmental option.

2.8.28 It is concluded that:

- in light of the work carried out by HS2 Ltd in liaison with the Environment Agency, all practicable measures to mitigate any adverse impacts on surface water bodies and groundwater have been identified, and those measures will continue to be reviewed;
- the RBMP process is subject to review and any effects of the Proposed Scheme will be taken into account in future RBMP;
- there is an overriding public interest in the construction of the Proposed Scheme, and in any event the benefits of the scheme as a form of sustainable development outweigh the benefits of achieving the objectives in Article 4(1) (to the limited extent that the Proposed Scheme would hinder the attainment of those objectives); and
- there are no better environmental options to the works described which are technically feasible and proportionate in cost.

2.8.29 For those reasons, even if the Proposed Scheme does result in the deterioration in status of a body of surface water or groundwater, there would be no breach of the WFD.

3 Route-wide flood risk assessment

3.1 Introduction

3.1.1 This section of the report forms the route-wide flood risk assessment for the Proposed Scheme. It should be read in conjunction with the flood risk assessments carried out for each CFA. These flood risk assessments are included in Volume 5: Appendices WR-003.

3.1.2 This assessment explains the process whereby the Proposed Scheme will be evaluated and the application of the sequential and exception tests.

3.1.3 It describes the main features of the Proposed Scheme and how it is divided into each CFA.

3.1.4 The methodology used to assess the Proposed Scheme is described.

3.1.5 The assessment considers the risk associated with all sources of flooding that may be potentially affected by the Proposed Scheme and how these could impact the construction and operation of the railway.

3.1.6 It assesses what measures are planned to avoid or minimise flood risk; both to the Proposed Scheme and receptors in the catchments through which it passes.

3.1.7 It describes the key residual route-wide flood risks to the Proposed Scheme. It gives an overview of significant residual effects on other receptors.

3.2 Description of the Proposed Scheme

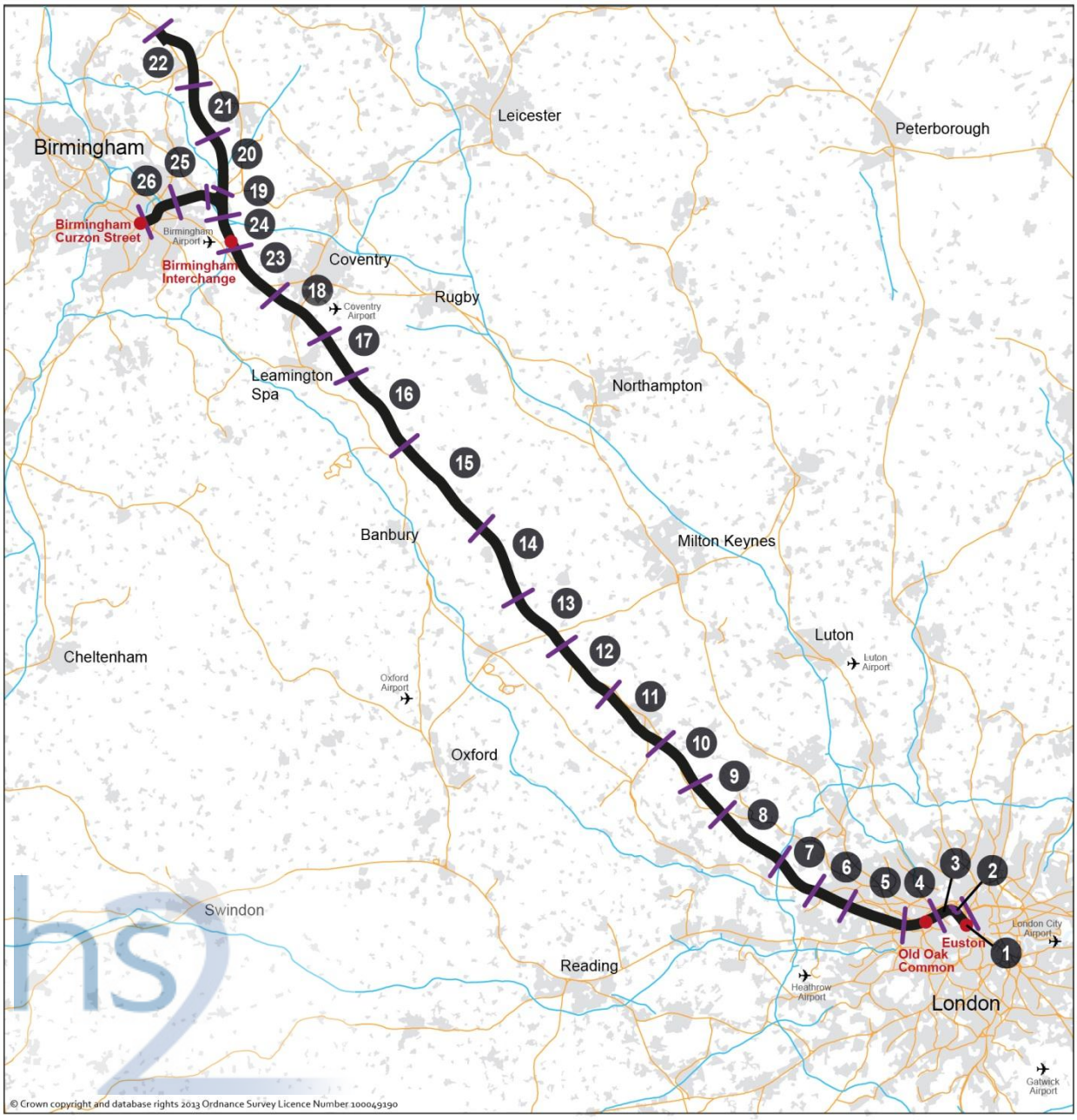
3.2.1 A detailed description of the Proposed Scheme is included in Volume 1, Section 4.

3.2.2 Figure 4 shows each CFA that have formed the basis for public consultation. These areas are also listed within Table 19: List of community forum areas. Engagement and consultation has been undertaken to encourage a dialogue and exchange of views with local and statutory authorities, individual members of the public and their representatives. Consultation has allowed the public to respond to design development of the Proposed Scheme and to input to decision making through an exchange of views.

Table 19: List of community forum areas

Number	Name
CFA1	Euston - Station and Approach
CFA2	Camden Town and HS1 Link
CFA3	Primrose Hill to Kilburn (Camden)
CFA4	Kilburn (Brent) to Old Oak Common
CFA5	Northolt Corridor
CFA6	South Ruislip to Ickenham
CFA7	Colne Valley
CFA8	The Chalfonts and Amersham
CFA9	Central Chilterns
CFA10	Dunsmore, Wendover and Halton
CFA11	Stoke Mandeville and Aylesbury
CFA12	Waddesdon and Quainton
CFA13	Calvert, Steeple Claydon, Twyford and Chetwode
CFA14	Newton Purcell to Brackley
CFA15	Greatworth to Lower Boddington
CFA16	Ladbroke and Southam
CFA17	Offchurch and Cubbington
CFA18	Stoneleigh, Kenilworth and Burton Green
CFA19	Coleshill Junction
CFA20	Curdworth to Middleton
CFA21	Drayton Bassett, Hints and Weeford
CFA22	Whittington to Handsacre
CFA23	Balsall Common and Hampton-in-Arden
CFA24	Birmingham Interchange and Chelmsley Wood
CFA25	Castle Bromwich and Bromford
CFA26	Washwood Heath to Curzon Street

Figure 4: Community forum areas



Community forum areas

1. Euston - Station and Approach
2. Camden Town and HS1 Link
3. Primrose Hill to Kilburn (Camden)
4. Kilburn (Brent) to Old Oak Common
5. Northolt Corridor
6. South Ruislip to Ickenham
7. Colne Valley
8. The Chalfonts and Amersham
9. Central Chilterns
10. Dunsmore, Wendover and Halton
11. Stoke Mandeville and Aylesbury
12. Waddesdon and Quainton
13. Calvert, Steeple Claydon, Twyford and Chetwode
14. Newton Purcell to Brackley
15. Greatworth to Lower Boddington
16. Ladbroke and Southam
17. Offchurch and Cubbington
18. Stoneleigh, Kenilworth and Burton Green
19. Coleshill Junction
20. Curdworth to Middleton
21. Drayton Bassett, Hints and Weeford
22. Whittington to Handsacre
23. Balsall Common and Hampton-in-Arden
24. Birmingham Interchange and Chelmsley Wood
25. Castle Bromwich and Bromford
26. Washwood Heath to Curzon Street

HS2 station
Proposed Phase One route
CFA boundary
Existing railways
Motorways
Airports

N

0 20 km approx

3.3 Assessment methodology

Source-pathway-receptor model

3.3.1 Flood risk is assessed using the source-pathway-receptor model. In this model, individual sources of flooding within the study area are identified. The primary source of flooding is rainfall, which is a direct source in the short-term (direct surface water runoff) and can lead to flooding from watercourses (river flooding) and overloaded artificial collection systems (sewers) in the short or medium-term. Stored rainfall, either naturally in below ground aquifers and natural lakes or artificially in impounded reservoirs and canals can lead to flooding when the storage capacity of the system is exceeded or if failure occurs. A final source of flooding arises from tidal effects and storm surges caused by low pressure systems over the sea and estuaries.

3.3.2 For there to be a risk of flooding at an individual receptor there must be a pathway linking it to the source of flooding. The pathways within the study area are assessed by reviewing datasets that show the spatial distribution of flood risk. The associated risk magnitude is then categorised.

3.3.3 Receptors considered in this assessment include the Proposed Scheme and existing development within 1km of the centreline of the route, except where there is clearly no hydraulic connectivity. For urban areas, the extent was reduced to 500m. Outside of these distances it is unlikely that direct impacts upon the water environment will be attributable to the Proposed Scheme. The Proposed Scheme includes all associated permanent infrastructure. Areas of interest are identified through comparison of the national spatial datasets with the design drawings. Where a risk is identified, mitigation is proposed in line with recommendations in the NPPF.

3.3.4 Existing developments within the study area are identified using Ordnance Survey (OS) mapping information and a 1 km buffer from the centre line of the route. A high-level screening assessment is then undertaken to identify receptors that are within or in close proximity to an area of flood risk via pathways indicated using the flood risk data sources listed below. The vulnerability of each receptor is classified in accordance with Table 2 of the NPPF Technical Guidance Document[21] and set out in Table 43 of the SMR Addendum (see Volume 5, Appendix CT-001-000/2).

3.3.5 The assessment then considers the vulnerability of the receptor with reference to the flood risk category of the source using Table 3 of the NPPF Technical Guidance Document and assesses whether the scheme has any potential to influence or alter the risk of flooding to each receptor. Where such potential has been identified, mitigation is proposed based on further analysis.

3.3.6 A precautionary approach was adopted when devising the criteria for determining a significant effect on flood risk, as defined in the SMR Addendum. For example, an increase in peak flood level for a 1% annual probability event, including an allowance for climate change, of more than 50mm is defined as a moderate adverse impact,

[21] Department for Communities and Local Government (2006) *Planning Policy Statement 25: Development and Flood Risk (2006) – superseded in 2012 by NPPF and Technical Guidance.*

which when applied to a less vulnerable receptor such as a business premise or agricultural land, produces a moderate adverse effect which is significant.

Flood risk categories

3.3.7 The level of flood risk is categorised by assessing the design elements against the datasets for each source. A matrix showing the flood risk category associated with each flooding source is presented in Table 20. Flooding from tidal effects and storm surges caused by low pressure systems over the sea and estuaries is not considered to be a source of flooding for the Proposed Scheme and is not included further in this assessment.

Table 20: Flood risk category matrix for all flooding sources

Source of flooding	Flood risk category				
	No risk	**Low**	**Medium**	**High**	**Very high**
Rivers		Flood Zone 1	Flood Zone 2	Flood Zone 3a	Flood Zone 3b
Direct surface water runoff	No surface water flooding.	Surface water <0.3m for 1 in 200 years event.	Surface water >0.3m for 1 in 200 years event; and Surface water <0.3m for 1 in 30 years event.	Surface water >0.3m for 1 in 30 years event.	
Groundwater		Very low-low	Moderate	High-very high	
Drainage and sewer systems	No sewer in vicinity of site.	Surcharge point >20m from site and no pathways.	Surcharge point within 20m of site and restricted pathways.	Sewer network crosses site and pathways exist.	
Artificial sources	Outside of inundation mapping / no pathway exists.	Within inundation mapping / pathway exists.			

3.4 Sequential and exception tests

Sequential test

3.4.1 The flood risk sequential test is an approach set out in the NPPF and supporting technical guidance on flood risk and its predecessors, notably Planning Policy Statement 25 (PPS25) and supporting practice guide.

3.4.2 The sequential test is a test usually undertaken by the Local Planning Authority, as the decision maker in determining whether a given development is appropriately sited in the location with the lowest probability of flooding.

3.4.3 The sequential test is described in paragraph 101 of the NPPF which states: *"The aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding. Development should not be allocated or permitted if there are reasonably*

available sites appropriate for the proposed development in areas with a lower probability of flooding. The Strategic Flood Risk Assessment will provide the basis for applying this test. A sequential approach should be used in areas known to be at risk from any form of flooding."

3.4.4 The NPPF Technical Guidance in paragraphs 4 and 5, makes it clear that it is for the decision maker to apply the sequential test.

3.4.5 Avoidance of areas with a high probability of flooding was a consideration in Appendix 5 of the Appraisal of Sustainability (AoS)[22], which considered several route options. The following paragraphs were contained in Appendix 5 of the AoS:

- *3.3.1 "Under the terms of Planning Policy Statement 25 (PPS25), any development must be designed to avoid placing people at risk of flooding, and to ensure that there is no increase in the risk of flooding on other properties as a result of the proposed development. PPS25 requires a sequential risk-based approach to determining the suitability of land for development, consisting two tests:*

  The Sequential Test is used to discourage development within flood prone areas where alternative land is reasonably available. A linear development such as HS2 must traverse all flood zones at some stage, and transport infrastructure is not exempt from any flood zones.

  The Exception Test is used to manage flood risk where development is necessary in land of higher flood risk, as determined through the Sequential Test. It should be applied as early as possible in the planning process.

  The principles of these two tests have been used to sift options and identify the proposed route options.

- *3.3.2 For a strategic level analysis, including option selection and identification of the proposed route options, the Environment Agency Flood Zones provide sufficient guidance on the likely impacts of development. As with any country-wide study, the Flood Zones are occasionally subject to error, but they provide a robust level of detail for the scale of assessment required in this strategic study. Should the scheme progress to the next stage, extant Strategic Flood Risk Assessments for the areas crossed by the scheme would be examined in greater detail to inform preparation of a Flood Risk Assessment for the scheme itself."*

3.4.6 In paragraph 2.2.1 of the report to the Government: *"Review of HS2 London to West Midlands route selection and speed" (January 2012)*[23], the following statement was included:

- *"The consultation documents described the route selection process we adopted in selecting and designing the consultation route using a three stage process, an initial long list of options covering stations and route sections was gradually*

[22] Booze Temple (2011), *HS2 London to the West Midlands Appraisal of Sustainability, Volume 1: Main Report*.
23 HS2 Ltd (2012),*Review of HS2 London to West Midlands Route Selection and Speed, A report to Government*.

reduced. A number of criteria were adopted during each stage, including cost and engineering feasibility, demand and environmental impacts."

3.4.7 The excerpts from the AoS and route selection review show that environmental considerations, and in particular the flood zone data provided by the Environment Agency were used in the route selection process. The selection process therefore took into consideration the guidance on the application of the sequential test.

3.4.8 Following publication of the AoS and the route selection review, the preferred route of the Proposed Scheme was announced by the Secretary of State in January 2012.

3.4.9 It is considered therefore that the sequential test has been applied.

Exception test

3.4.10 The NPPF indicates in paragraph 102 that 'wider sustainability objectives' can be a reason as to why some development such as essential infrastructure, which includes the Proposed Scheme, must inevitably be located in areas at risk of flooding: *"If, following application of the sequential test, it is not possible, consistent with wider sustainability objectives, for the development to be located in zones with a lower probability of flooding, the exception test can be applied if appropriate."*

3.4.11 The approach for the exception test is also set out within paragraph 102 of the NPPF and supporting technical guidance. It further states in paragraph 102 that for certain types of development, where the sequential test has been applied, for the exception test to be passed:

- *"It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk - informed by the SFRA when one is available.*
- *A site specific FRA must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall".*

3.4.12 It is considered that the Proposed Scheme will provide wider sustainability benefits to the community, as demonstrated in Volume 2 and Volume 3. The FRA for each CFA demonstrates that the Proposed Scheme will be safe from flooding for its lifetime and will not increase flood risk to highly vulnerable or more vulnerable receptors elsewhere. This includes those locations where the route passes through areas at high risk of flooding. There are locations where flood risk will be reduced.

3.4.13 It is considered therefore that the exception test has been applied for the Proposed Scheme.

3.5 Avoidance and mitigation measures

Principal design criteria

3.5.1 The Proposed Scheme will provide a safe and reliable high speed rail link which will be compatible with the existing rail network and also HS1.

3.5.2 The railway will provide a passenger only service and will not provide freight operation.

3.5.3 The scheme design shall seek to ensure that any adverse impacts as a result of its development will be designed out or minimised as far as practicably possible.

Approach to design for flood risk management

3.5.4 The overall project seeks to ensure that there is no increase in flood risk to existing vulnerable receptors as a result of the Proposed Scheme. This will be achieved by ensuring that overall flood storage capacity is maintained including an allowance for climate change.

3.5.5 In line with the NPPF technical guidance, increases in peak rainfall intensity of 30% and peak river flow of 20% on gauged rivers, as a result of climate change, have been allowed for as per the period 2085 to 2115. This increase has been used for the purposes of assessing flood risk. For un-gauged watercourses, the hydraulic modelling involves a 30% increase in peak river flow, in place of the recommended the 20% allowance for climate change. This figure is more precautionary and allows for uncertainty in the base estimates for un-gauged catchments.

3.5.6 All underbridge and viaduct crossings will be designed to convey the 1 in 100 (1%) annual probability flow (with allowance for climate change). A minimum of 600mm freeboard will be provided to bridge soffit levels which will allow for safe debris passage should flooding occur. On main rivers, where reasonably practicable, a freeboard of 1m has been allowed.

3.5.7 Consideration has been given in the design to the inclusion of appropriate maintenance access requirements for watercourses.

3.5.8 Culverts will be designed to convey the 1 in 100 (1%) annual probability flow (with allowance for climate change), with a freeboard of 300mm as a minimum applied for the culvert design. The design has also taken into account setting inverts of culverts below the firm bed level of the watercourse and the inclusion of mammal ledges, where appropriate.

3.5.9 The design will minimise any requirement for replacement floodplain storage areas.

3.5.10 For resilience purposes, the proposed rail infrastructure will be designed to ensure the safe operation of trains during the 1 in 1000 (0.1%) annual probability event for all types of flooding. Although the railway drainage will be designed to have capacity up to the 1 in 100 (1%) annual probability event including an allowance for climate change, the design will also ensure that the flood level does not encroach within 1m of the track level during the 1 in 1000 (0.1%) annual probability event.

3.5.11 All drainage will be attenuated in order that peak surface water run-off from the proposed infrastructure is no greater than the run-off under the 1 in 100 (1%) annual probability peak event including an allowance for climate change.

3.6 Key residual risks

3.6.1 The key residual risks are listed in the following. These are listed in two categories: risk to the Proposed Scheme, or resilience risks, and risks to other receptors, or environmental risks.

Risks to the Proposed Scheme

3.6.2 There are no likely residual significant flood risks to the Proposed Scheme.

Risks to other receptors

3.6.3 There are not likely to be significant regional or route-wide temporary or permanent adverse effects on flood risk as a result of the construction process or the operation and maintenance of the Proposed Scheme.

3.6.4 The assessments of effects at a CFA level are reported in the FRA for each CFA (Volume 5: Appendices WR-003-001 to WR-003-026).

4 Draft operation and maintenance plan for water resources and flood risk

4.1 Introduction

4.1.1 This section provides a high level approach to the operation and maintenance of water management assets for the Proposed Scheme setting out the nature of the work, possible sources of pollution and flood risk as a result of rail operations, and measures to manage these and the residual risks. It has been developed using guidance from other infrastructure operators and agreements they may have with regulatory bodies such as the Environment Agency. An example of such guidance is the Network Rail Drainage Systems Manual (NR/L3/CIV/005/1, 2011)[24], which states that drainage systems for railways infrastructure are required to:

- collect and carry water from rainfall and/or run off from adjacent land, from flooded rivers, the sea or groundwater so that risks to the stability and/or operation of infrastructure are acceptable; and
- prevent pollutants from leaving infrastructure in an uncontrolled manner.

4.1.2 To deliver this, drainage systems should:

- operate without blocking;
- mitigate flooding and surcharging following rainfall events that resulted in a reduction in safety or loss of performance; and
- provide access for maintenance.

4.1.3 This draft plan[25] establishes the principles the nominated undertaker of the Proposed Scheme may wish to consider as part of a future memorandum of understanding (MoU) with the Environment Agency.

4.1.4 The operation and maintenance plan for water resources and flood risk will evolve and is subject to refinement, amendment and expansion as necessary as the Proposed Scheme's design, assessment, consultation and Parliamentary processes develop. Engagement with stakeholders will inform its future development.

4.2 Proposed Scheme operation and maintenance

Operation of the Proposed Scheme

4.2.1 The Proposed Scheme will be operated using electric passenger trains.

4.2.2 The trains will use an intelligent maintenance system to avoid maintenance having to be carried out anywhere except in controlled conditions in depots.

[24] Network Rail (2011), *Drainage Systems Manual (NR/L3/CIV/005/1)*.
[25] This draft operation and maintenance plan should not be taken to represent the views of the Secretary of State for Transport until such time as it has been finalised prior to Royal Assent to the Bill.

Risks from operation

4.2.3 It is anticipated that there is a potential risk from the deposit of hydrocarbons from lubrication systems and power supply systems from the trains during operation. Whilst there is no data available at this time to indicate the quantity of these used during operations, there is no evidence to indicate any damage to the environment from modern electric trains.

4.2.4 No significant pollution incidents have been reported by the Environment Agency from the operation and maintenance of HS1.

4.2.5 On HS1 in depots where trains are stabled there is no visible hydrocarbon pollution. In the case of the Proposed Scheme, it is anticipated that losses will not be significant and should be mitigated by the proposed track bed and associated drainage system.

4.2.6 There is no data available on the pollution impact on the water environment from high speed railways. The following case study illustrates research carried out to assess the quantitative impact of metal contaminants affecting the water bodies.

Case study: Research on impacts from metal contaminants on watercourses

In order to quantitatively assess the impact from track drainage on receiving water quality geochemical modelling was undertaken to predict water quality from operational drainage arising from the wear and release of metal components to the track drainage.

The principal metals released to the track are iron, copper and zinc. The iron mainly arises from wheel and track wear, copper is derived from the attrition and wear of the copper contact wire as part of the overhead electrification apparatus and zinc is mainly derived from the galvanised parts of the masts, poles and structures.

The quantities of these metals released during railway operations was the subject of a study conducted on the Swiss Federal railway network in 2008 Burkhard et al[26]. It was also noted that the main source of polycyclic aromatic hydrocarbon (PAH) is creosote treated sleepers which will not be used in HS2.

Using data from Burkhard, the modelling showed that the principal metal release in track drainage is dissolved zinc with a predicted concentration of 274µg/l. Dissolved copper was predicted to be 74 µg/l and dissolved iron (ferric) was a much lower 2.3 x 10-6 µg/l. An initial dilution of around 3.5 for zinc and 7 times for copper upon discharge to the water environment is required to achieve the relevant environmental quality standard (EQS) for freshwater bodies. This is for surface water with moderate hardness (100-250mgl/l CaCO3).

Maintenance of the Proposed Scheme

4.2.7 The maintenance of the Proposed Scheme rolling stock will be carried out in depots under controlled conditions.

[26] Burkhardt et al (2008) Elsevier:*Diffuse release of environmental hazards by railways*.

4.2.8 Maintenance of the infrastructure could be managed using a system, based on PAS 55[27].

Risks from maintenance of the Proposed Scheme

4.2.9 The following maintenance activities pose a potential risk of pollution to the water environment:

- maintenance of the drainage system entraining sediments and discharging them to the environment;
- maintenance of rolling stock including washing;
- maintenance of power distribution infrastructure including the auto-transformer and feeder stations;
- de-icing of rolling stock, infrastructure and facilities
- mobile wastewater systems at temporary welfare facilities during works;
- weed control; and
- accidental spillage of fuels or chemicals during maintenance.

Incidents

4.2.10 Risks to the water environment in the event of a major incident could arise from:

- damage to drainage infrastructure;
- accidental spillage of fuels or chemicals as a result of the incident or its management;
- chemicals used in fire fighting; and
- products of combustion dissolved or suspended in water.

Major works

4.2.11 Major works during operation that could affect surface or groundwater quality, flows and levels include:

- excavations;
- work in cuttings; and
- work near watercourses.

4.2.12 Major works will be implemented using an environmental management plan that will specify requirements for the contractor to follow to avoid or reduce potential environmental impacts.

4.2.13 Where it is assessed that such works could significantly affect such quality, flows or levels, discussions shall be held with the appropriate regulatory authority. Monitoring

[27] British Standards Institute (2008) *Publicly Available Specification 55: Asset Management*.

may be required to ensure there is no significant effect, and effective controls put in place if monitoring shows there to be the potential for a significant effect, whether temporary or permanent.

4.2.14 Work that could affect a watercourse or is within byelaw distance of a watercourse normally require approval from the appropriate regulatory authority.

Flooding

4.2.15 The Proposed Scheme will fall into the Centre for the Protection of National Infrastructure definition of "those facilities, systems, sites and networks necessary for the functioning of the country and the delivery of the essential services upon which daily life in the UK depends"[28].

4.2.16 Flood risk is the product of the likelihood of a flood event occurring and the severity of the consequences. Flood consequence severity depends on the flooding vulnerability of a particular receptor as defined by the NPPF and supporting Technical Guidance.

4.2.17 Loss of performance, both service and structural, can lead to failure of the drainage systems and subsequently to flooding.

4.2.18 Assessing flood risk is an important consideration for the Proposed Scheme, and is considered an integral part of the operational decision making process. A route-wide flood risk assessment (Section 3 of this appendix) and CFA specific FRA (Volume 5: Appendices WR-003) have been undertaken.

4.2.19 For the Proposed Scheme, high level climate change risk and resilience assessments as part of the ES have been undertaken to identify the potential risks of climate change on the Proposed Scheme, and to assess the Proposed Scheme's resilience and capacity to cope with these potential risks (see Volume 5: Appendix CL-003-000).

4.3 Management measures

4.3.1 Constructed controls fall into three categories:

- planned;
- passive; and
- active.

4.3.2 Planned controls refer to measures designed to avoid or reduce the potential for pollution or flooding. This involves the identification of sensitive or risk prone areas such as Sites of Special Scientific Interest (SSSI) or Source Protection Zones (SPZ), watercourses crossed by viaducts, or groundwater bodies traversed by cuttings and designing the infrastructure in such a way that potentially negative impacts are eliminated. For example, the Proposed Scheme has been designed to withstand a 1 in 1,000 (0.1%)annual probability flooding event with a 1m freeboard below top of rail level. Where slab track is used it will reduce the need for herbicides.

[28] Centre for the Protection of National Infrastructure (2013), *The national infrastructure*. www.cpni.gov.uk/about/cni Accessed 20 September 2013.

4.3.3 Passive controls need no manual operation, though they require regular inspection and maintenance, and provide effective pollution and flood risk mitigation. These include SuDS (balancing ponds, swales and filter drains) and the ballast substrate, where it exists, acting as a filter to any contaminated sediments. SuDS are particularly effective in the management of pollution from metals and will be used as appropriate. SuDS guidance including details of legislation and regulations applying to surface waters, ground waters, waste management, flood management, reservoir safety, drainage, water quality, biodiversity and health and safety is provided in CIRIA (2004) C625: Model agreements for sustainable water management systems[29].

4.3.4 Active controls require manual operation and include items such as penstocks, rings for oil booms, shut off valves and filter membranes included as appropriate in the detailed design and their management requirements included in any drainage management plan and pollution response plan.

4.3.5 CIRIA (2005) C643 Potential for Water Pollution from Railways[30] provides further guidance on the operational and environmental management of railways with regard to water pollution.

4.3.6 The following management plans are examples of management measures the nominated undertaker for the Proposed Scheme may wish to consider developing and implementing.

Drainage management plan

4.3.7 A drainage management plan could be compiled for each railway drainage system or set of such systems. The purpose of a drainage management plan is to record the strategy for achieving prescribed levels of serviceability and maintenance of a drainage system(s).

4.3.8 The scope of a drainage management plan would be complete drainage systems, including both track and off-track drainage, aligned where practical with the discrete route management sections adopted by the Proposed Scheme.

4.3.9 An integrated prioritisation system could be developed in cooperation with other engineering disciplines and infrastructure maintenance teams to prioritise remediation and maintenance.

4.3.10 Each drainage management plan could record:

- asset inventory and condition;
- the extent of the drainage system including a location plan on a suitable geographic information system (GIS) platform referenced to the UK Ordnance Survey (OS) datum;
- location and details of drainage systems abutting, feeding or receiving flow to or from railway drainage systems that could affect the safety or performance of the rail network;

[29] CIRIA (2004) *C625: Model agreements for sustainable water management systems*.
[30] CIRIA (2005) *C643 Potential for Water Pollution from Railways*.

- inspection intervals and the particular features to be observed;
- additional investigations required to improve asset performance knowledge;
- locations where inadequate drainage capacity could affect the safety or performance of the rail network;
- locations such as discharge of drainage from long viaducts over sensitive watercourses;
- a risk based priority plan for maintenance;
- where waste exemptions and consent for maintenance are necessary and held;
- requirements for monitoring and/or other conditions specified in consents.

4.3.11 Each drainage management plan would be reviewed at intervals and also following completion of any new works or the failure of the drainage system, and amended as necessary.

Pollution response plan

4.3.12 A pollution response plan could be compiled for each railway drainage system or set of such systems including track systems and off track systems.

4.3.13 The purpose of a pollution response plan is to record the potential sources of pollution, location of outfalls and control points and sets out the procedures for rapidly responding to and managing pollution events. It should refer to the drainage management plan.

4.3.14 Each pollution response plan could record:

- the drainage catchment and its associated outfalls and control points;
- potential receptors and their sensitivity;
- the potential pollutants, where known;
- plans for storage of materials at depots or sidings;
- the location of management materials (spill kits etc.);
- immediate action drills;
- list of first responders and their duties; and
- contact list for regulatory bodies and emergency services

4.3.15 Pollution prevention guidance (PPG) is provided by the Environment Agency. Of particular relevance are:

- PPG21 Incident response planning[31]; and
- PPG5: Works and maintenance in or near water[32].

[31] Environment Agency (2009) *Pollution prevention guideline 21: Incident response planning*.

4.3.16 Each pollution response plan would be reviewed at intervals and also following completion of any new works or a major pollution incident, and amended as necessary.

Flood risk management plan

4.3.17 Flood risk assessment is carried out using a source-pathway-receptor model.

4.3.18 Mitigation of identified flood risks could be achieved through:

- management measures where a person is appointed to coordinate all flood related activities; attend regional flood coordination meetings with other organisations; receive and react to flood warnings; target inspections and prioritise drainage maintenance to known flood hotspots and locations dependent on pumped drainage systems; and
- physical measures such as cut-off drains on cuttings; or providing extra planting to absorb or slow down runoff.

4.3.19 Flood risk management plans for specific sites would take note of the FRA in the ES and any site specific assessments.

4.3.20 CIRIA (2010) C688 Flood resilience and resistance for critical infrastructure[33] provides comprehensive guidance.

4.3.21 Each flood risk management plan would be reviewed at intervals and also following completion of any new works or a major flooding event, and amended as necessary.

4.4 Management considerations for works

Environmental management

4.4.1 The risk assessment for the method of working should include consideration of environmental risks, including:

- contaminated sediment or spoil that is to be removed from drains;
- waste disposal;
- protected sites and species;
- the potential discharge to ground, coastal and surface waters and the associated flood risk; and
- the presence of invasive weeds.

4.4.2 Waste material from site work should be removed so as not to contaminate surrounding ground, groundwater, watercourses and other bodies of water, ballast, walkways, and places of safety.

[32] Environment Agency (2007) Pollution prevention guideline 5: Works and maintenance in or near water.
[33] CIRIA (2010) C688 Flood resilience and resistance for critical infrastructure.

4.4.3 As part of the work planning process, it should be ascertained whether the worksite is in or adjacent to a protected site such as a SSSI or SPZ, or where the work has the potential to detrimentally affect a nearby protected site. If this is possible, one of the following options should be followed:

- if a site management statement/management agreement (SMS) is held for the site, checks should be carried out to ascertain whether the proposed works are approved in the SMS. Where the proposed works are approved in the SMS, works should be carried out in accordance with any controls listed in the SMS; and/or
- where works are not approved in a SMS, or a SMS is not held for the site, consultation should be undertaken with the relevant regulatory body and any necessary approvals obtained.

4.4.4 Work planning should include a review of the ES to determine whether the location is known to contain any protected species. If protected species are identified at the location an ecologist or other environment professional should be consulted and agreement reached on the actions to be taken to maintain the protection of the species and its habitat. Any required approvals would be obtained prior to undertaking any works. CIRIA (2011) C691 Working with wildlife: guidance for the construction industry[34] and C613 (2004) Working with Wildlife; A Resource and Training Pack for the Construction Industry[35] provides guidance on the legislative and best-practice approach to take with regard to various legally protected and unprotected species.

Surface and groundwater

4.4.5 Work on the drainage system might require an approval to discharge to surface or groundwater (including indirect discharges). Where there is any doubt about whether an approval to discharge is required, consultation should be undertaken with the relevant regulatory body.

4.4.6 Discharges to groundwater would be assessed to determine their risk to WFD status and groundwater SPZ, and the Environment Agency would be consulted to determine the extent of any limitations on discharges in the proposed area.

4.4.7 Guidance on legal requirements relating to works and maintenance in or near water is available in PPG5: Works and maintenance in or near water published by the Environment Agency.

Discharge to sewers

4.4.8 When trade effluent is planned to be diverted to a sewer, approval should be sought from the relevant sewerage authority.

Flood risk management during maintenance work

4.4.9 Diverting water from railway land should include consideration:

[34] CIRIA (2011) C691 Working with wildlife: guidance for the construction industry.
[35] CIRA (2004) C613Working with Wildlife; A Resource and Training Pack for the Construction Industry.

- of the need to consult with the Environment Agency or other regulatory bodies; such as the Water Authority and Natural England; and
- of the impact of changes in water management on land owned by outside parties, on watercourses and other bodies of water, and any mitigation required.

Effluent

4.4.10 Where effluent (e.g. sewage or chemicals) is present in a railway drainage system, control measures should be put in place to ensure the pollutants are collected and disposed of at an approved location. Testing may be required prior to removal of the material, to determine where it can be disposed.

Invasive species

4.4.11 When invasive species (principally plants) are identified before or during works, suitable control measures should be implemented to prevent their spread and the waste.

4.4.12 The Proposed Scheme would involve spraying as required with herbicides from rail mounted multipurpose vehicles to control the build-up of weeds in the ballast which reduces the performance of the formation. HS2 Ltd could aim to implement a similar regime to the existing agreement between Network Rail and the Environment Agency whereby the use of herbicides is agreed and reviewed at intervals and also the controls on the weather conditions in which it is suitable to spray. There is a very limited list of herbicides which are licensed for use on the railway.

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WR-001-000-Annex A: Surface Water Body Assessments

Water Body ID	Surface Water Body Name	CFA	Catchments
GB70610078	Grand Union Canal, Uxbridge to Hanwell Locks, Slough Arm, Paddington Arm	1, 2, 3, 4, 5	N/A
GB106039023590	Brent (below Silk stream down to the Thames)	4, 5	London
GB106039023030	Crane (including part of the Yeading Brook)	5	London
GB106039023050	Yeading Brook (East Arm)	5, 6	London
GB106039023060	Yeading Brook (West Arm)	5, 6	London
GB106039023070	Pinn	5, 6	Colne
GB70610252	Grand Union Canal, Maple Lodge to Uxbridge (Rivers Colne and Chess plus canal sections)	7	N/A
GB106039023090	Colne and Grand Union Canal (from confluence with Chess to Ash)	7	Colne
GB106039029830	Misbourne	7, 8, 9	Colne
GB106039030380	Bear Brook and Wendover Brook	10	Thame and South Chilterns
GB106039030320	Stoke Brook Aylesbury	10, 11	Thame and South Chilterns
GB106039030350	Bear Brook, Hartwell Ditch, at west Aylesbury	11	Thame and South Chilterns
GB106039030370	Thame (Aylesbury to Scotsgrove Brook)	11	Thame and South Chilterns
GB106039030420	Fleet Marston Brook, Denham Brook, Pitchcott Brook west	11, 12	Thame and South Chilterns
GB106039030070	Tetchwick Brook, Source to Ray and tributaries	12	Cherwell
GB106039030100	Ray and tributaries Northeast of Grendon Underwood	12	Cherwell
GB106039030060	Ludgershall Brook and Muswellhill Brook	12	Cherwell
GB105033030560	Twin	13	Upper and Bedford Ouse
GB105033038210	Padbury Brook (The Twins)	13, 14	Upper and Bedford Ouse
GB105033037860	Ouse	13, 14	Upper and Bedford Ouse
GB105033037880	Ouse	14	Upper and Bedford Ouse
GB105033037950	Ouse (Beds)	15	Upper and Bedford Ouse
GB105033037940	Radstone Brook	14, 15	Upper and Bedford Ouse
GB105033038230	Helmdon Brook	15	Upper and Bedford Ouse
GB106039037290	Farthinghoe Stream (Source to Cherwell) and tributaries	15	Cherwell
GB106039037350	Cherwell (Ashby Brook to Cropredy)	15	Cherwell
GB1060339037310	Cherwell (Cropredy to Nell Bridge)	15	Cherwell
GB106039037370	Clayton and Wormleighton Brook, Source to Highfurlong Brook	15	Cherwell
GB106039042660	Highfurlong Brook (Source to Wormleighton Brook)	15	Cherwell
GB106039037330	Highfurlong Brook (Wormleighton to Cherwell)	15	Cherwell
GB806100002	Boddington Feeder (Oxford Canal)	15	N/A
GB70910196	Oxford Canal, summit pound	16	N/A
GB109054044070	River Itchen - source to confluence with River Stowe	16	Warwickshire Avon
GB109054044110	River Itchen – confluence with River Stowe to confluence with River Leam	16	Warwickshire Avon
GB70910511	Grand Union Canal, Braunston to Leamington Spa	16, 17	N/A
GB109054044140	River Leam - confluence with River Itchen to confluence with River Avon	17	Warwickshire Avon
GB109054043840	River Avon (Warks) – confluence with River Sowe to confluence with River Leam	17, 18	Warwickshire Avon
GB109054043920	River Avon – Claycoton Yelvertoft Brook to confluence with River Sowe	18	Warwickshire Avon
GB109054044540	River Sowe - confluence with Smite Brook to confluence with River Avon	18	Warwickshire Avon
GB109054044480	Finham Brook – confluence with Canley Brook to confluence with River Sowe	18	Warwickshire Avon
GB109054044520	Canley Brook - source to confluence with Finham Brook	18	Warwickshire Avon
GB104028042571	River Blythe from Temple Balsall Brook to Patrick Bridge	23	Tame Anker and Mease
GB104028042572	River Blythe from Patrick Bridge to River Tame	23, 24	Tame Anker and Mease
GB104028042420	River Cole from Hatchford- Kingshurst Brook to River Blythe	19	Tame Anker and Mease
GB104028046840	River Tame from Confluence of the two arms to River Blythe	19, 20, 25, 26	Tame Anker and Mease
GB104028046440	River Tame from River Blythe to River Anker	20	Tame Anker and Mease
GB104028046860	Plants Brook Catchment (tributary of Tame)	25	Tame Anker and Mease
GB104028042550	River Rea from Bourn Brook to River Tame	26	Tame Anker and Mease
GB70410515	Birmingham & Fazeley Canal upper section	20	N/A
GB104028046850	Middleton Hall Catch - tributary of Langley Brook	20, 21	Tame Anker and Mease
GB104028046890	Langley Brook from Source to Middleton Hall Catch	20	Tame Anker and Mease
GB104028046900	Langley Brook from Middleton Hall Catch to River Tame	20, 21	Tame Anker and Mease
GB104028047000	Black-Bourne Brook from source (confluence) to River Tame	21	Tame Anker and Mease
GB104028047020	East Litchfield catchment - tributary of Tame	22	Tame Anker and Mease
GB104028047050	River Tame from River Anker to River Trent	22	Tame Anker and Mease
GB70910212	Coventry and Ashby Canals	22	N/A
GB104028047250	Pyford Brook Catchment (tributary of Trent)	22	Staffordshire Trent Valley
GB104028047270	Bourne-Bilson Brook Catchment (trib utary of Trent)	22	Staffordshire Trent Valley
GB104028047290	River Trent from Moreton Brook to River Tame	22	Staffordshire Trent Valley
GB70410142	Trent & Mersey Canal, summit to Alrewas	22	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Bored Tunnel - Northolt Tunnel				Bored Tunnel - Euston Tunnel				Bored Tunnel - Euston Tunnel				Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
	GB70610078	Moderate	Good Ecological Potential by 2015	Description of scheme element impact	*Northolt Tunnel beneath Grand Union Canal (SWC-CFA5-04). Potential settlement caused by tunnelling activities and nearby Mandeville Road and Greenpark Way vent shaft.*				*Euston Tunnel - HS1-HS2 Link Tunnel underneath Grand Union Canal (Uxbridge to Hanwell Locks, Slough Arm, Paddington Arm) (SWC-CFA4-01). Worksite and temporary crossings across and in close vicinity of Grand Union Canal, office accommodation, storage facilities nearby and stockpiles.*				*Euston Tunnel - close to Euston Station (unnamed in CFA Figure although assumed SWC-CFA3-01). Nearby construction works and potential settlement from tunnelling.*						Construction	Operation		
	Grand Union Canal, Uxbridge to Hanwell Locks, Slough Arm, Paddington Arm			Identified biological impacts	Noise and Vibration	Dewatering of excavations during construction	Drainage	Landtake (for slab or other surface infrastructure overlaying tunnel)	Noise and Vibration	Dewatering of excavations during construction	Drainage	Landtake (for slab or other surface infrastructure overlaying tunnel)	Noise and Vibration	Dewatering of excavations during construction	Drainage	Landtake (for slab or other surface infrastructure overlaying tunnel)						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms			Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	2. Macrophytes and phytobenthos - macrophytes	-	-		- Receptor is insensitive to impact.	- No likely impact of dewatering as groundwater not source of water to canals.	CoCP measures will ensure that there will be no effects on macrophytes.	No slab or other structure proposed.	- Receptor is insensitive to impact.	- No likely impact of dewatering as groundwater not source of water to canals.	CoCP measures will ensure that there will be no effects on macrophytes.	No slab or other structure proposed.	- Receptor is insensitive to impact.	- No likely impact of dewatering as groundwater not source of water to canals.	CoCP measures will ensure that there will be no effects on macrophytes.	No slab or other structure proposed.	None identified.	No anticipated effects.	Other than implementation of relevant Environment Agency Pollution Prevention Guidelines (PPG) during construction, no other mitigation measures are required.	No further mitigations measures than those included within the current design appear necessary	No significant effects	
	3. Macroinvertebrates	-	-		- Receptor is insensitive to impact.	- No likely impact of dewatering as groundwater not source of water to canals.	CoCP measures will ensure that there will be no effects on macroinvertebrates.	No slab or other structure proposed.	- Receptor is insensitive to impact.	- No likely impact of dewatering as groundwater not source of water to canals.	CoCP measures will ensure that there will be no effects on macroinvertebrates.	No slab or other structure proposed.	- Receptor is insensitive to impact.	- No likely impact of dewatering as groundwater not source of water to canals.	CoCP measures will ensure that there will be no effects on macroinvertebrates.	No slab or other structure proposed.	None identified.	No anticipated effects.	Other than implementation of relevant Environment Agency Pollution Prevention Guidelines (PPG) during construction, no other mitigation measures are required.	No further mitigations measures than those included within the current design appear necessary	No significant effects	-
	4. Fish	-	-		- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). - There were no baseline fish surveys. - Effects are likely to be temporary and localised.	- No likely impact of dewatering as groundwater not source of water to canals.	CoCP measures will ensure that there will be no effects on fish.	No slab or other structure proposed.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). - There were no baseline fish surveys. - Effects are likely to be temporary and localised.	- No likely impact of dewatering as groundwater not source of water to canals.	CoCP measures will ensure that there will be no effects on fish.	No slab or other structure proposed.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). - There were no baseline fish surveys. - Effects are likely to be temporary and localised.	- No likely impact of dewatering as groundwater not source of water to canals.	CoCP measures will ensure that there will be no effects on fish.	No slab or other structure proposed.	None identified.	Possible minor and localised effects during construction (effects of vibration on fish)	Other than implementation of relevant Environment Agency Pollution Prevention Guidelines (PPG) during construction, no other mitigation measures are required.	No further mitigations measures than those included within the current design appear necessary	Minor and localised effects	
	Physico-Chemical status																					
WFD classification elements	5. Dissolved Oxygen	Good	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	- No likely impact of dewatering as groundwater not source of water to canals.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	N/A	- No likely impact of dewatering as groundwater not source of water to canals.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	N/A	- No likely impact of dewatering as groundwater not source of water to canals.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	None identified.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are considered temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	No further mitigation measures than those included within the current design appear necessary	No further mitigation measures than those included within the current design appear necessary	No significant effects	-
	6. pH	High	-		N/A		Receptor is insensitive to impact	N/A	N/A		Receptor is insensitive to impact	N/A	N/A		• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	None identified.					
	7. Phosphate	Moderate	-		N/A		• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	N/A		• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	N/A		• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	None identified.					
	8. Ammonia	High	-		N/A		• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	N/A		• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	N/A		• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	None identified.					
	9. Temperature	-	-		N/A		Receptor is insensitive to impact	N/A	N/A		Receptor is insensitive to impact	N/A	N/A		Receptor is insensitive to impact	N/A	None identified.					
	10. Specific Pollutants (Annex VIII)	High	-		N/A		• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	N/A		• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	N/A		• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	None identified.					
	Hydromorphological status																					**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	13. River continuity	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	14. River depth and width variation bed	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen																		
Manage disturbance	-	-	Predicted Change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-	-	No impact on this objective	None required	None required	No significant effects	-
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	No impact on this objective	None required	None required	No significant effects	
Avoid the need to dredge (e.g. minimise under-keel clearance; use fluid mud navigation; flow manipulation or training works)	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	No impact on this objective	None required	None required	No significant effects	
Prepare a dredging / disposal strategy	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	No impact on this objective	None required	None required	No significant effects	
Reduce impact of dredging	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	No impact on this objective	None required	None required	No significant effects	
Reduce sediment resuspension	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	No impact on this objective	None required	None required	No significant effects	
Alter timing of dredging / disposal	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	No impact on this objective	None required	None required	No significant effects	
Bank rehabilitation / reprofiling	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	No impact on this objective	None required	None required	No significant effects	
Site selection (dredged material disposal) (e.g. avoid sensitive sites)	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	No impact on this objective	None required	None required	No significant effects	
Awareness raising / information boards (boat wash / sources of fine sediment)	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	No impact on this objective	None required	None required	No significant effects	
Phased de-watering and other techniques	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	No impact on this objective	None required	None required	No significant effects	
Selective vegetation control regime	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	No impact on this objective	None required	None required	No significant effects	
Appropriate vegetation control technique	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	No impact on this objective	None required	None required	No significant effects	
Appropriate timing (vegetation control)	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	No impact on this objective	None required	None required	No significant effects	
Appropriate techniques (invasive species)	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	No impact on this objective	None required	None required	No significant effects	
Modify vessel design	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	No impact on this objective	None required	None required	No significant effects	
Vessel Management	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	No impact on this objective	None required	None required	No significant effects	
Sediment management	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	No impact on this objective	None required	None required	No significant effects	

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Bored Tunnel (Northolt Tunnel)					Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	-
	GB106039023590	Poor	Good Ecological Potential by 2027	Description of scheme element impact	Northolt tunnel (13.4km) passes directly underneath River Brent (SWC-CFAS-1) and two culverted tributaries of the River Brent, Perivale Industrial Park (SWC-CFAS-2) and Costons Brook (SWC-CFAS-3) . Settlement predicted to be minor and very localised as a result of underlying clay. Tunnel drainage will be directed towards the vent shafts, where it will be pumped to the surface and discharged as appropriate. It is anticipated that discharge will be through a connection to the Thames Water sewer network.							Construction	Operation		
	Brent (below Silk stream down to the Thames)			Identified biological impacts	Noise and Vibration	Drainage	Settlement of ground leading to enhancement of fractures and increased vertical permeability	Dewatering of excavations during construction	Landtake (for slab or other surface infrastructure overlaying tunnel)						
WFD classification elements	1. Macrophytes and phytobenthos - diatoms	Poor	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	Poor	Good by 2027		Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Settlement at watercourse crossings predicted to be minor and very localised (15 Water Chapter Vol 5). No likely effect anticipated.	As tunnel crossing near the River Brent is located on unproductive strata, no dewatering is expected to be necessary. If shallow groundwater is encountered and dewatering is needed, any reduction in groundwater levels is likely to be negligible on flows on the River Brent. No effect anticipated on this quality element.	No slab or other structure proposed	Upstream water body not impacted by scheme	Scheme elements present on this water body are likely to have no significant effects on this quality element. No effect anticipated at the scale of the water body. The macrophytes quality element does not currently have a status.	None required	None required	This quality element does not currently have a status, and no effect is anticipated at the scale of the water body.	-
	3. Macroinvertebrates	Bad	Good by 2027		Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Settlement at watercourse crossings predicted to be minor and very localised (15 Water Chapter Vol 5). No likely effect anticipated.	As tunnel crossing near the River Brent is located on unproductive strata, no dewatering is expected to be necessary. If shallow groundwater is encountered and dewatering is needed, any reduction in groundwater levels is likely to be negligible on flows on the River Brent. No effect anticipated on this quality element.	No slab or other structure proposed	Upstream water body not impacted by scheme	Scheme elements present on this water body are likely to have no significant effects on this quality element. No effect anticipated at the scale of the water body. The scheme therefore is not considered as having the potential to deteriorate the current WFD status (bad) of this quality element.	None required	None required	The scheme therefore is not considered as having the potential to deteriorate the current WFD status (Bad) of this quality element	-
	4. Fish	Poor	Good by 2027		Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). However, effects are likely to be temporary and localised.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Settlement at watercourse crossings predicted to be minor and very localised (15 Water Chapter Vol 5). No likely effect anticipated.	As tunnel crossing near the River Brent is located on unproductive strata, no dewatering is expected to be necessary. If shallow groundwater is encountered and dewatering is needed, any reduction in groundwater levels is likely to be negligible on flows on the River Brent. No effect anticipated on this quality element.	No slab or other structure proposed	Upstream water body not impacted by scheme	Scheme elements present on this water body are likely to have only temporary and localised effects on this quality element. As the River Brent is a designated fisheries, and in the absence of mitigation measures, the scheme could potentially have a minor very localised adverse effect. Given these elements, the scheme is therefore not considered as having the potential to deteriorate the current WFD status (Poor) of this quality element	None required	None required	The scheme is not considered as having the potential to deteriorate the current WFD status (Poor) of this quality element.	-
	Physico-Chemical status														
WFD classification elements	5. Dissolved Oxygen	Good	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	As tunnel crossing near the River Brent is located on unproductive strata, no dewatering is expected to be necessary. If shallow groundwater is encountered and dewatering is needed, any reduction in groundwater levels is likely to be negligible on flows on the River Brent. No effect anticipated on this quality element.	N/A	Upstream water body not impacted by scheme	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer. Therefore, impacts arising from construction is impossible. Where this is the case, impacts are considered temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. The scheme will be designed to manage surface water drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required	None required	N/A	-
	6. pH	High	-		N/A	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	N/A	Upstream water body not impacted by scheme					-
	7. Phosphate	Poor	-		N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	As tunnel crossing near the River Brent is located on unproductive strata, no dewatering is expected to be necessary. If shallow groundwater is encountered and dewatering is needed, any reduction in groundwater levels is likely to be negligible on flows on the River Brent. No effect anticipated on this quality element.	N/A	Upstream water body not impacted by scheme					-
	8. Ammonia	Good	-		N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	As tunnel crossing near the River Brent is located on unproductive strata, no dewatering is expected to be necessary. If shallow groundwater is encountered and dewatering is needed, any reduction in groundwater levels is likely to be negligible on flows on the River Brent. No effect anticipated on this quality element.	N/A	Upstream water body not impacted by scheme					-
	9. Temperature	-	-		N/A	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	N/A	Upstream water body not impacted by scheme					-
	10. Specific Pollutants (Annex VIII)	High	-		N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	As tunnel crossing near the River Brent is located on unproductive strata, no dewatering is expected to be necessary. If shallow groundwater is encountered and dewatering is needed, any reduction in groundwater levels is likely to be negligible on flows on the River Brent. No effect anticipated on this quality element.	N/A	Upstream water body not impacted by scheme					-
	Hydromorphological status														**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	• Settlement can open up fissures which could lead to increased vertical permeability to underlying aquifers, and loss of flow, with associated effects on flow dynamics, continuity and sediment transport and bed sedimentation. The risk of impacts to hydromorphology is low and if impacts were to occur the effects would probably be minor or negligible.	• Dewatering can decrease flow rates, with associated effects on flow dynamics, continuity and sediment transport and bed sedimentation. However, as tunnelling will be in unproductive clay strata, there is unlikely to be any impact on surface water flow or groundwater levels. The risk of impacts to hydromorphology is low and if impacts were to occur the effects would probably be minor or negligible.	N/A	Upstream water body not impacted by scheme	There is a very low risk of small impacts on flow, but overall the likelihood of effects on hydromorphology is considered to be negligible	None required	None required	N/A	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A			N/A	Upstream water body not impacted by scheme		None required	None required		
	13. River continuity	-	-		N/A	N/A			N/A	Upstream water body not impacted by scheme		None required	None required		
	14. River depth and width variation bed	-	-		N/A	N/A			N/A	Upstream water body not impacted by scheme		None required	None required		
	15. Structure and substrate of river bed	-	-		N/A	N/A			N/A	Upstream water body not impacted by scheme		None required	None required		
	16. Structure of riparian zone	-	-		N/A	N/A			N/A	Upstream water body not impacted by scheme		None required	None required		

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	-	-	-	-	-	-	-	-	-	-	-	-
Bank rehabilitation / reprofiling	-	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Reduce sediment resuspension	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Sediment management	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Manage disturbance	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Ensure the rate and range of any artificial drawdown is appropriately managed to maintain aquatic plant and animal communities in the shore zone of water courses and canals	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Phased de-watering and other techniques	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Selective vegetation control regime	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Appropriate water level management strategies, including timing and volume of water moved	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Appropriate vegetation control technique	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Ensure there is an appropriate baseline flow regime downstream of the impoundment	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Appropriate channel maintenance strategies and techniques - woody debris	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Appropriate channel maintenance strategies and techniques - minimize disturbance to channel bed and margins.	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Sediment management strategies (develop and revise)	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Appropriate techniques (invasive species)	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Appropriate timing (vegetation control)	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Appropriate techniques to align and attenuate flow to limit detrimental effects of these features (drainage)	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Preserve and, where possible, restore historic aquatic habitats	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Flood bunds (earth banks, in place of floodwalls)	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Increase in-channel morphological diversity	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Removal of hard bank reinforcement / revetment, or replacement with soft engineering solution	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Re-opening existing culverts	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Alteration of channel bed (within culvert)	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Set-back embankments	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Improve floodplain connectivity	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Operational and structural changes to locks, sluices, weirs, beach control, etc.	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Remove obsolete structure	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Retain marginal aquatic and riparian habitats (channel alteration)	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Structures or other mechanisms in place and managed to enable fish to access waters upstream and downstream of the impounding body	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Impacts from other WFD water bodies (assessed separately) - Northolt tunnel (GB106039023060 (Yeading Brook (West Arm)) and GB106039023050 (Yeading Brook (East Arm)))	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
				Description of scheme element impact			Construction	Operation		
	GB106039023030	Poor	Good Ecological Potential by 2027							
	Crane (including part of the Yeading Brook)			Identified biological impacts						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	
	2. Macrophytes and phytobenthos - macrophytes	Moderate	Not required		Upstream water bodies (GB106039023060 and GB106039023050) are impacted by the Northolt bored tunnel. Only localised and temporary effects were anticipated on these water bodies. Therefore, no effect anticipated on this quality element of the Crane.	No scheme elements located on this water body. Scheme elements located on the upstream water bodies are not considered as having the potential to affect this quality element. Therefore, overall effect of the scheme considered to be negligible and not to have the potential of deteriorating the current WFD status of this quality element (Moderate).	None required.	None required.	The scheme is not considered as having the potential to deteriorate the current WFD status (Moderate) of this quality element.	
	3. Macroinvertebrates	Moderate	Not required		Upstream water bodies (GB106039023060 and GB106039023050) are impacted by the Northolt bored tunnel. Only localised and temporary effects were anticipated on these water bodies. Therefore, no effect anticipated on this quality element of the Crane.	No scheme elements located on this water body. Scheme elements located on the upstream water bodies are not considered as having the potential to affect this quality element. Therefore, the overall effect of the scheme considered to be negligible and not to have the potential of deteriorating the current WFD status of this quality element (Moderate).	None required.	None required.	The scheme is not considered as having the potential to deteriorate the current WFD status (Moderate) of this quality element.	
	4. Fish	Poor	Not required		Upstream water bodies (GB106039023060 and GB106039023050) are impacted by the Northolt bored tunnel. Only localised and temporary effects were anticipated on these water bodies. Therefore, no effect anticipated on this quality element of the Crane.	No scheme elements located on this water body. Scheme elements located on the upstream water bodies are not considered as having the potential to affect this quality element. Therefore, the overall effect of the scheme considered to be negligible and not to have the potential of deteriorating the current WFD status of this quality element (Poor).	None required.	None required.	The scheme is not considered as having the potential to deteriorate the current WFD status (Poor) of this quality element.	
	Physico-Chemical status									
WFD classification elements	5. Dissolved Oxygen	Not assessed	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	Upstream water bodies (GB106039023060 and GB106039023050) are impacted by the Northolt bored tunnel. Only localised and temporary effects were anticipated on these water bodies. Therefore, no effect anticipated on this quality element.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	N/A	
	6. pH	Not assessed	-		Upstream water bodies (GB106039023060 and GB106039023050) are impacted by the Northolt bored tunnel. Only localised and temporary effects were anticipated on these water bodies. Therefore, no effect anticipated on this quality element.					
	7. Phosphate	Not assessed	-		Upstream water bodies (GB106039023060 and GB106039023050) are impacted by the Northolt bored tunnel. Only localised and temporary effects were anticipated on these water bodies. Therefore, no effect anticipated on this quality element.					
	8. Ammonia	Not assessed	-		Upstream water bodies (GB106039023060 and GB106039023050) are impacted by the Northolt bored tunnel. Only localised and temporary effects were anticipated on these water bodies. Therefore, no effect anticipated on this quality element.					
	9. Temperature	Not assessed	-		Upstream water bodies (GB106039023060 and GB106039023050) are impacted by the Northolt bored tunnel. Only localised and temporary effects were anticipated on these water bodies. Therefore, no effect anticipated on this quality element.					
	10. Specific Pollutants (Annex VIII)	Not assessed	-		Upstream water bodies (GB106039023060 and GB106039023050) are impacted by the Northolt bored tunnel. Only localised and temporary effects were anticipated on these water bodies. Therefore, no effect anticipated on this quality element.					
	Hydromorphological status									**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	Upstream water bodies (GB106039023060 and GB106039023050) are impacted by the Northolt bored tunnel. No potential impacts related to hydromorphology were identified on these water bodies and, therefore, no effect is anticipated.	No scheme elements located on this water body. Scheme elements located on the upstream water bodies are not considered as having the potential to affect the hydromorphology and, therefore, overall effect of the scheme considered to be negligible.	None required.	None required.	N/A	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		Upstream water bodies (GB106039023060 and GB106039023050) are impacted by the Northolt bored tunnel. No potential impacts related to hydromorphology were identified on these water bodies and, therefore, no effect is anticipated.					
	13. River continuity	-	-		Upstream water bodies (GB106039023060 and GB106039023050) are impacted by the Northolt bored tunnel. No potential impacts related to hydromorphology were identified on these water bodies and, therefore, no effect is anticipated.					
	14. River depth and width variation bed	-	-		Upstream water bodies (GB106039023060 and GB106039023050) are impacted by the Northolt bored tunnel. No potential impacts related to hydromorphology were identified on these water bodies and, therefore, no effect is anticipated.					
	15. Structure and substrate of river bed	-	-		Upstream water bodies (GB106039023060 and GB106039023050) are impacted by the Northolt bored tunnel. No potential impacts related to hydromorphology were identified on these water bodies and, therefore, no effect is anticipated.					
	16. Structure of riparian zone	-	-		Upstream water bodies (GB106039023060 and GB106039023050) are impacted by the Northolt bored tunnel. No potential impacts related to hydromorphology were identified on these water bodies and, therefore, no effect is anticipated.					

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen		-	-	-	-	-	-
Appropriate techniques (invasive species)	In Place	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	Overall there is judged to be no significant impact on existing or future status	N/A	N/A	N/A	The scheme is identified as having no significant on this water body and is therefore unlikely to compromise the achievement of this measure.	N/A
Appropriate timing (vegetation control)	In Place	-			N/A	N/A	N/A	The scheme is identified as having no significant on this water body and is therefore unlikely to compromise the achievement of this measure.	N/A
Appropriate vegetation control technique	In Place	-			N/A	N/A	N/A	The scheme is identified as having no significant on this water body and is therefore unlikely to compromise the achievement of this measure.	N/A
Selective vegetation control regime	In Place	-			N/A	N/A	N/A	The scheme is identified as having no significant on this water body and is therefore unlikely to compromise the achievement of this measure.	N/A
Educate landowners on sensitive management practices (urbanisation)	Not in place	-			N/A	N/A	N/A	The scheme is identified as having no significant on this water body and is therefore unlikely to compromise the implementation of this measure.	N/A
Retain marginal aquatic and riparian habitats (channel alteration)	Not in place	-			N/A	N/A	N/A	The scheme is identified as having no significant on this water body and is therefore unlikely to compromise the implementation of this measure.	N/A
Operational and structural changes to locks, sluices, weirs, beach control, etc.	Not in place	-			N/A	N/A	N/A	The scheme is identified as having no significant on this water body and is therefore unlikely to compromise the implementation of this measure.	N/A
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	Not in place	-			N/A	N/A	N/A	The scheme is identified as having no significant on this water body and is therefore unlikely to compromise the implementation of this measure.	N/A
Structures or other mechanisms in place and managed to enable fish to access waters upstream and downstream of the impounding works.	Not in place	-			N/A	N/A	N/A	The scheme is identified as having no significant on this water body and is therefore unlikely to compromise the implementation of this measure.	N/A
Alteration of channel bed (within culvert)	Not in place	-			N/A	N/A	N/A	The scheme is identified as having no significant on this water body and is therefore unlikely to compromise the implementation of this measure.	N/A
Re-opening existing culverts	Not in place	-			N/A	N/A	N/A	The scheme is identified as having no significant on this water body and is therefore unlikely to compromise the implementation of this measure.	N/A
Increase in-channel morphological diversity	Not in place	-			N/A	N/A	N/A	The scheme is identified as having no significant on this water body and is therefore unlikely to compromise the implementation of this measure.	N/A
Preserve and, where possible, restore historic aquatic habitats	Not in place	-			N/A	N/A	N/A	The scheme is identified as having no significant on this water body and is therefore unlikely to compromise the implementation of this measure.	N/A
Removal of hard bank reinforcement / revetment, or replacement with soft engineering solution	Not in place	-			N/A	N/A	N/A	The scheme is identified as having no significant on this water body and is therefore unlikely to compromise the implementation of this measure.	N/A
Remove obsolete structure	Not in place	-			N/A	N/A	N/A	The scheme is identified as having no significant on this water body and is therefore unlikely to compromise the implementation of this measure.	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Bored Tunnel					Impacts from other WFD water bodies (assessed separately) - Scheme elements on GB106039023060 (Yeading Brook (West Arm))	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	-
	GB106039023050	Moderate	Good Ecological Potential by 2027	Description of scheme element impact	Northolt tunnel (13.4km) passes directly underneath Yeading Brook East (SWC-CFA6-1). Settlement predicted to be minor and very localised as a result of underlying clay. Tunnel drainage will be directed towards the vent shafts, where it will be pumped to the surface and discharged as appropriate. It is anticipated that discharge will be through a connection to the Thames Water sewer network.							Construction	Operation		
	Yeading Brook (East Arm)			Identified biological impacts	Noise and Vibration	Drainage	Settlement of ground leading to enhancement of fractures and increased vertical permeability	Dewatering of excavations during construction	Landtake (for slab or other surface infrastructure overlaying tunnel)						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	-	-		Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	Settlement at watercourse crossings predicted to be minor and very localised (ES Water Chapter Vol 5) No likely effect anticipated.	As tunnel crossings near Yeading Brook are located on unproductive clay strata, no dewatering is expected to be necessary. No effect anticipated on this quality element.	No slab or other structure proposed.	Upstream water body (GB106039023060) only impacted by the same bored tunnel (Northolt tunnel). No additional effect anticipated.	Scheme elements present on this water body are likely to have no significant effects on this quality element. No effect anticipated at the scale of the water body. The macrophytes quality element does not currently have a status.	None required	None required	This quality element does not currently have a status, and no effect is anticipated at the scale of the water body.	-
	3. Macroinvertebrates	Poor	Good by 2027 ?		Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	Settlement at watercourse crossings predicted to be minor and very localised (ES Water Chapter Vol 5) No likely effect anticipated.	As tunnel crossings near Yeading Brook are located on unproductive clay strata, no dewatering is expected to be necessary. No effect anticipated on this quality element.	No slab or other structure proposed.	Upstream water body (GB106039023060) only impacted by the same bored tunnel (Northolt tunnel). No additional effect anticipated.	Scheme elements present on this water body are likely to have no significant effects on this quality element. No effect anticipated at the scale of the water body. The scheme therefore is not considered as having the potential to deteriorate the current WFD status (Poor) of this quality element.	None required	None required	The scheme is not considered as having the potential to deteriorate the current WFD status (Poor) of this quality element.	-
	4. Fish	-	-		Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). However, effects are likely to be temporary and localised.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	Settlement at watercourse crossings predicted to be minor and very localised (ES Water Chapter Vol 5) No likely effect anticipated.	As tunnel crossings near Yeading Brook are located on unproductive clay strata, no dewatering is expected to be necessary. No effect anticipated on this quality element.	No slab or other structure proposed.	Upstream water body (GB106039023060) only impacted by the same bored tunnel (Northolt tunnel). No additional effect anticipated.	Scheme elements present on this water body are likely to have only localised and temporary effects on this quality element. No effect anticipated at the scale of the water body. The scheme therefore is not considered as having the potential to deteriorate the current WFD status (Moderate) of this quality element.	None required	None required	This quality element does not currently have a status, and no effect is anticipated at the scale of the water body.	-
	Physico-Chemical status														
WFD classification elements	5. Dissolved Oxygen	Not assessed	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	As tunnel crossings near Yeading Brook are located on unproductive clay strata, no dewatering is expected to be necessary. No effect anticipated on this quality element.	N/A	Upstream water body (GB106039023060) only impacted by the same bored tunnel (Northolt tunnel). No additional effect anticipated.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are considered temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required	None required	N/A	-
	6. pH	Not assessed	-		N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	As tunnel crossings near Yeading Brook are located on unproductive clay strata, no dewatering is expected to be necessary. No effect anticipated on this quality element.	N/A	Upstream water body (GB106039023060) only impacted by the same bored tunnel (Northolt tunnel). No additional effect anticipated.					-
	7. Phosphate	Not assessed	-		N/A	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	N/A	Upstream water body (GB106039023060) only impacted by the same bored tunnel (Northolt tunnel). No additional effect anticipated.					-
	8. Ammonia	Not assessed	-		N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	As tunnel crossings near Yeading Brook are located on unproductive clay strata, no dewatering is expected to be necessary. No effect anticipated on this quality element.	N/A	Upstream water body (GB106039023060) only impacted by the same bored tunnel (Northolt tunnel). No additional effect anticipated.					-
	9. Temperature	Not assessed	-		N/A	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	N/A	Upstream water body (GB106039023060) only impacted by the same bored tunnel (Northolt tunnel). No additional effect anticipated.					-
	10. Specific Pollutants (Annex VIII)	Not assessed	-		N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	As tunnel crossings near Yeading Brook are located on unproductive clay strata, no dewatering is expected to be necessary. No effect anticipated on this quality element.	N/A	Upstream water body (GB106039023060) only impacted by the same bored tunnel (Northolt tunnel). No additional effect anticipated.					-
	Hydromorphological status														**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• Settlement can open up fissures which could lead to increased vertical permeability to underlying aquifers and loss of flow, with associated effects on flow dynamics, continuity and sediment transport and bed sedimentation. The risk of impacts to hydromorphology is low, especially as tunnelling will be within unproductive clay strata, and if impacts were to occur the effects would probably be minor or negligible.	• Dewatering can decrease flow rates, with associated effects on flow dynamics, continuity and sediment transport and bed sedimentation. However, as tunnelling will be in unproductive clay strata, there is unlikely to be any impact on surface water from any dewatering that takes place. The risk of impacts to hydromorphology is low and if impacts were to occur the effects would probably be minor or negligible.	N/A	Upstream water body (GB106039023060) only impacted by the same bored tunnel (Northolt tunnel). No additional effect anticipated.	It is unlikely that there will be any impact on the contribution of surface water flow from groundwater during any dewatering, and therefore it is considered that there will be no effects on hydromorphology.	None required	None required	N/A	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A			N/A			None required	None required		
	13. River continuity	-	-		N/A	N/A			N/A			None required	None required		
	14. River depth and width variation bed	-	-		N/A	N/A			N/A			None required	None required		
	15. Structure and substrate of river bed	-	-		N/A	N/A			N/A			None required	None required		
	16. Structure of riparian zone	-	-		N/A	N/A			N/A			None required	None required		

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	-						-	-				
Appropriate techniques (invasive species)	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Appropriate timing (vegetation control)	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Appropriate vegetation control technique	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Selective vegetation control regime	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Retain marginal aquatic and riparian habitats (channel alteration)	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Operational and structural changes to locks, sluices, weirs, beach control, etc.	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Structures or other mechanisms in place and managed to enable fish to access waters upstream and downstream of the impounding works.	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Alteration of channel bed (within culvert)	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Re-opening existing culverts	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Increase in-channel morphological diversity	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Preserve and, where possible, restore historic aquatic habitats	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Removal of hard bank reinforcement / revetment, or replacement with soft engineering solution	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A
Remove obsolete structure	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated	N/A	N/A	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Bored Tunnel					Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	-
	GB106039023060	Moderate	Good Ecological Potential by 2027	Description of scheme element impact	Northolt tunnel (13.4km) passes directly underneath Yeading Brook West (SWC-CFA6-4 and SWC-CFA6-5). Settlement predicted to be minor and very localised as a result of underlying clay. Tunnel drainage will be directed towards the vent shafts, where it will be pumped to the surface and discharged as appropriate. It is anticipated that discharge will be through a connection to the Thames Water sewer network.							Construction	Operation		
	Yeading Brook (West Arm)			Identified biological impacts	Noise and Vibration	Drainage	Settlement of ground leading to enhancement of fractures and increased vertical permeability	Dewatering of excavations during construction	Landtake (for slab or other surface infrastructure overlaying tunnel)						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	-	-		Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	Settlement at watercourse crossings predicted to be minor and very localised (ES Water Chapter Vol 5). No likely effect anticipated.	As tunnel crossings near Yeading Brook are located on unproductive clay strata, no dewatering is expected to be necessary. No effect anticipated on this quality element.	No slab or other structure proposed.	No scheme element on upstream water body	Scheme elements present on this water body are likely to have no significant effects on this quality element. No effect anticipated at the scale of the water body. The macrophytes quality element does not currently have a status.	None required.	None required.	N/A	-
	3. Macroinvertebrates	Poor	Good by 2027 ?		Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	Settlement at watercourse crossings predicted to be minor and very localised (ES Water Chapter Vol 5). No likely effect anticipated.	As tunnel crossings near Yeading Brook are located on unproductive clay strata, no dewatering is expected to be necessary. No effect anticipated on this quality element.	No slab or other structure proposed.	No scheme element on upstream water body	Scheme elements present on this water body are likely to have no significant effects on this quality element. No effect anticipated at the scale of the water body. The macrophytes quality element does not currently have a status. The scheme therefore is not considered as having the potential to deteriorate the current WFD status (Poor) of this quality element.	None required.	None required.	N/A	-
	4. Fish	Moderate	Good by 2027 ?		Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). However, effects are likely to be temporary and localised.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	Settlement at watercourse crossings predicted to be minor and very localised (ES Water Chapter Vol 5). No likely effect anticipated.	As tunnel crossings near Yeading Brook are located on unproductive clay strata, no dewatering is expected to be necessary. No effect anticipated on this quality element.	No slab or other structure proposed.	No scheme element on upstream water body	Scheme elements present on this water body are likely to have only localised and temporary effects on this quality element. No effect anticipated at the scale of the water body. The macrophytes quality element does not currently have a status. The scheme therefore is not considered as having the potential to deteriorate the current WFD status (Moderate) of this quality element.	None required.	None required.	N/A	-
	Physico-Chemical status														
WFD classification elements	5. Dissolved Oxygen	Not assessed	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	As tunnel crossings near Yeading Brook are located on unproductive clay strata, no dewatering is expected to be necessary. No effect anticipated on this quality element.	N/A	No scheme element on upstream water body	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are considered temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	N/A	-
	6. pH	Not assessed	-		N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	As tunnel crossings near Yeading Brook are located on unproductive clay strata, no dewatering is expected to be necessary. No effect anticipated on this quality element.	N/A	No scheme element on upstream water body					-
	7. Phosphate	Not assessed	-		N/A	Receptor is insensitive to impact	N/A	As tunnel crossings near Yeading Brook are located on unproductive clay strata, no dewatering is expected to be necessary. No effect anticipated on this quality element.	N/A	No scheme element on upstream water body					-
	8. Ammonia	Not assessed	-		N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	As tunnel crossings near Yeading Brook are located on unproductive clay strata, no dewatering is expected to be necessary. No effect anticipated on this quality element.	N/A	No scheme element on upstream water body					-
	9. Temperature	Not assessed	-		N/A	Receptor is insensitive to impact	N/A	As tunnel crossings near Yeading Brook are located on unproductive clay strata, no dewatering is expected to be necessary. No effect anticipated on this quality element.	N/A	No scheme element on upstream water body					-
	10. Specific Pollutants (Annex VIII)	Not assessed	-		N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Tunnel drainage will be pumped to the vent shafts for disposal to sewer.	N/A	As tunnel crossings near Yeading Brook are located on unproductive clay strata, no dewatering is expected to be necessary. No effect anticipated on this quality element.	N/A	No scheme element on upstream water body					-
	Hydromorphological status														**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• Settlement can open up fissures which could lead to increased vertical permeability to underlying aquifers and loss of flow, with associated effects on flow dynamics, continuity and sediment transport and bed sedimentation. The risk of impacts to hydromorphology is low, especially as tunnelling will be within unproductive clay strata, and if impacts were to occur the effects would probably be minor or negligible.	• Dewatering can decrease flow rates, with associated effects on flow dynamics, continuity and sediment transport and bed sedimentation. However, as tunnelling will be in unproductive clay strata, there is unlikely to be any impact on surface water from any dewatering that takes place. The risk of impacts to hydromorphology is low and if impacts were to occur the effects would probably be minor or negligible.	N/A	Upstream water body not impacted by scheme	It is unlikely that there will be any impact on the contribution of surface water flow from groundwater during any dewatering, and therefore it is considered that there will be no effects on hydromorphology.	None required	None required	N/A	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A			N/A	Upstream water body not impacted by scheme		None required	None required		
	13. River continuity	-	-		N/A	N/A			N/A	Upstream water body not impacted by scheme		None required	None required		
	14. River depth and width variation bed	-	-		N/A	N/A			N/A	Upstream water body not impacted by scheme		None required	None required		
	15. Structure and substrate of river bed	-	-		N/A	N/A			N/A	Upstream water body not impacted by scheme		None required	None required		
	16. Structure of riparian zone	-	-		N/A	N/A			N/A	Upstream water body not impacted by scheme		None required	None required		

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	-										
Appropriate timing (vegetation control)	In Place	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• Overall there is judged to be no significant impact on existing or future status	• Overall there is judged to be no significant impact on existing or future status	N/A	No effect anticipated	N/A	N/A	N/A	N/A	N/A
Appropriate vegetation control technique	In Place	-		N/A	N/A			N/A	No effect anticipated	N/A	N/A	N/A	N/A	N/A
Selective vegetation control regime	In Place	-		N/A	N/A			N/A	No effect anticipated	N/A	N/A	N/A	N/A	N/A
Retain marginal aquatic and riparian habitats (channel alteration)	Not in place	-		N/A	N/A			N/A	No effect anticipated	N/A	N/A	N/A	N/A	N/A
Operational and structural changes to locks, sluices, weirs, beach control, etc.	Not in place	-		N/A	N/A			N/A	No effect anticipated	N/A	N/A	N/A	N/A	N/A
Project re and where possible enhance ecological value of marginal aquatic habitat, banks and riparian	Not in place	-		N/A	N/A			N/A	No effect anticipated	N/A	N/A	N/A	N/A	N/A
structures or other mechanisms in place and managed to enable fish to access waters upstream and	Not in place	-		N/A	N/A			N/A	No effect anticipated	N/A	N/A	N/A	N/A	N/A
Alteration of channel bed (within culvert)	Not in place	-		N/A	N/A			N/A	No effect anticipated	N/A	N/A	N/A	N/A	N/A
Re-opening existing culverts	Not in place	-		N/A	N/A			N/A	No effect anticipated	N/A	N/A	N/A	N/A	N/A
Increase in-channel morphological diversity	Not in place	-		N/A	N/A			N/A	No effect anticipated	N/A	N/A	N/A	N/A	N/A
Preserve and, where possible, restore historic aquatic habitats	Not in place	-		N/A	N/A			N/A	No effect anticipated	N/A	N/A	N/A	N/A	N/A
Removal of hard bank reinforcement / revetment, or replacement with soft engineering solution	Not in place	-		N/A	N/A			N/A	No effect anticipated	N/A	N/A	N/A	N/A	N/A
Remove obsolete structure	Not in place	-		N/A	N/A			N/A	No effect anticipated	N/A	N/A	N/A	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	River Pinn Underbridge					River Diversion - Diversion of Ickenham stream (ordinary watercourse) alongside HS2.			Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
	GB106039023070	Moderate	Good Ecological Potential by 2027	Description of scheme element impact	Construction of new underbridge under the HS2 scheme. Clear span bridge with reinforced concrete wing walls within 10m of river channel. No diversion or slab.					Former GUC feeder, will now drain into River Pinn to avoid West Ruislip Retained Embankment.					Construction	Operation		
	Pinn			Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	-	-	Predicted change to status elements (green = none, amber = possible, red = likely)														
	2. Macrophytes and phytobenthos - macrophytes	-	-		Receptor not sensitive to impact. No likely effect anticipated.	The River Pinn supports in places abundant aquatic vegetation (HS2 baseline surveys). Bridge footings within 10m of the river channel, but not likely to affect marginal or channel macrophyte habitats.	Potential modification of macrophytes communities, due to reduction in photosynthetic activity. The River Pinn supports in places abundant aquatic vegetation (HS2 baseline surveys). Potential localised adverse effect anticipated.	No significant hydromorphological change expected. No likely effect.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change to macrophytes as a result of any minor changes in water quality.	Temporary and localised loss of macrophytes within Ickenham stream while the new channels re-establish. No baseline data available. Localised and temporary adverse effect on macrophytes anticipated.	The new channel will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. The diversion will also connect the Ickenham Stream to the River Pinn, (formerly GUC feeder), thus expanding the macrophyte habitat of the Pinn as a whole. Potential temporary effects on water quality are not anticipated to affect macrophytes. Overall, local effect is likely to be beneficial.	Potential loss of flows on and increase diversity of bed formations Ickenham Brook with no significant effect on the River Pinn. Effect likely to be negligible.	No scheme elements upstream water bodies	Scheme elements present on the River Pinn and its tributary are likely to be very localised (culvert) and / or temporary (river diversion) and adverse effects would be balanced by the creation of new habitat within the diverted channel of Ickenham Brook. Overall effect of the scheme will be considered as being locally adverse, but with no potential to lead to the deterioration of this quality element at the scale of the water body. No WFD status for this quality element.	None required.	None required.	Potential minor and localised effects	
	3. Macroinvertebrates	Moderate	-		Receptor not sensitive to impact. No likely effect anticipated.	No baseline data available. Bridge footings within 10m of the river channel, but not likely to affect marginal or channel macroinvertebrate habitats.	No measurable effect on macroinvertebrate community anticipated.	No significant hydromorphological change expected. No likely effect.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change to invertebrates as a result of any minor changes in water quality.	Temporary and localised loss of macroinvertebrate habitat within Ickenham stream while the new channels re-establish. No baseline data on the macroinvertebrate quality of the stream available. Localised and temporary adverse effect on macroinvertebrates expected.	The river diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach. The diversion will also connect the Ickenham Stream to the River Pinn (formerly GUC feeder), thus expanding the macroinvertebrate habitat of the Pinn as a whole. Potential temporary effects on water quality are not anticipated to affect macroinvertebrates. Overall, localised and minor beneficial effect anticipated.	Potential loss of flows on and increase diversity of bed formations Ickenham Brook with no significant effect on the River Pinn. Effect likely to be negligible.	No scheme elements upstream water bodies	Scheme elements present on the River Pinn and its tributary are likely to be very localised (culvert) and / or temporary (river diversion) and adverse effects would be balanced by the creation of new habitat within the diverted channel of Ickenham Brook. In the absence of baseline data for the River Pinn and Ickenham Broom, the overall effect of the scheme will be considered as being neutral.	None required.	None required.	No significant effects	
	4. Fish	Moderate	-		Potential localised, minor and temporary adverse effect during construction.	No baseline data available (HS2 baseline surveys). However, the River Pinn is a designated Freshwater Fish Directive water body. Bridge footings within 10m of the river channel, but not likely to affect marginal or channel macrophyte habitats.	No measurable effect on fish anticipated.	No significant hydromorphological change expected. No likely effect.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change to fish as a result of any minor changes in water quality.	Temporary and localised loss of fish habitat within Ickenham stream while the new channels re-establish. Fish kills possible while dewatering existing channels. No baseline data available. Effect considered to be local, minor adverse and temporary.	The range of habitats incorporated into the diverted channel likely to represent an improvement for fish habitat. The diversion will also connect the Ickenham Stream to the River Pinn (formerly GUC feeder), thus expanding the fish habitat of the Pinn as a whole and creating additional spawning/refuge for key fish (migratory or otherwise) within the Pinn. Potential temporary effects on water quality are not anticipated to have adverse effects on fish. Overall, locally beneficial effect anticipated.	Only minor and localised effects on flow dynamics anticipated, with no overall effect on fish.	No scheme elements upstream water bodies	Scheme elements present on the River Pinn and its tributary are likely to be very localised (culvert) and / or temporary (river diversion) and adverse effects would be balanced by the creation of new habitat within the diverted channel of Ickenham Brook. In the absence of baseline data for the River Pinn and Ickenham Broom, the overall effect of the scheme will be considered as being neutral.	None required.	None required.	No significant effects	
	Physico-Chemical status																	
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor with no degridation of current status anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	No upstream water bodies	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from road drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and uncontrolled discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	No significant effects	
	6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No upstream water bodies					
	7. Phosphate	Poor	-		N/A	N/A	N/A	effectively an open span bridge, so there would be no in	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	No upstream water bodies					
	8. Ammonia	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No upstream water bodies					
	9. Temperature	-	-		N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No upstream water bodies					
	10. Specific Pollutants (Annex VIII)	-	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	No upstream water bodies					
	Hydromorphological status																	**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	N/A	• Crossing is extension of existing underbridge that is already in place - so unlikely to be major change to existing element. • Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings • Overall, there is unlikely to be any hydromorphological impact	N/A	N/A	N/A	• Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics • Ickenham is a minor feeder of GUC, and in practical terms represents a small proportion of the water body • Proposed diversion will connect to the River Pinn further downstream reach, although the diversion is close to the existing channel course • There is unlikely to be any measurable impact on the quality and dynamic of river flow in the receiving water body (River Pinn), however possible loss of flow to the Ickenham Stream south of proposed diversion. • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of shortening the watercourse still needs to be flagged as a risk	No upstream water bodies	• Extension of underbridge unlikely to cause any hydromorphological impact as existing underbridge is already in place and the new crossing will continue to be an open span bridge and therefore no significant planform changes. • Impacts on river diversion are unlikely to be measurable, both in the reduction of flows in the diverted watercourse (Ickenham Stream - feeder to GUC) and the increase in flows in the receiving watercourse (River Pinn) due to the size of the diverted section.	None required.	None required.	No significant effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	No upstream water bodies					
	13. River continuity	-	-		N/A	N/A	N/A		N/A	N/A	N/A	• Shortening the channel may result in accelerated flows and reduced channel storage capacity, which in turn could increase overbank spillage and floodplain connectivity downstream • The size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected	No upstream water bodies					
	14. River depth and width variation bed	-	-		N/A	N/A	N/A		N/A	N/A	N/A	• The diversion would replicate existing channel cross section result • Increasing flow rates may result in local scour of the bed and banks which would promote morphological diversity and allow the channel to regain a dynamic equilibrium form • Some local scour and substrate deposition would promote morphological diversity • Overall , there is unlikely to be significant change	No upstream water bodies					
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A		N/A	N/A	N/A	• Shortening the channel could increase gradients and sediment transport rates • This could result in loss of substrates in the shortened reach, but increased diversity of bed formations immediately downstream and possibly increased sediment deposition • The locally increased gradient could trigger bed scour upstream as the channel adjusts to the steeper bed gradient • Given the size of the channel there is unlikely to be major adjustment, but this is still a risk	No upstream water bodies					
	16. Structure of riparian zone	-	-		N/A	N/A	N/A		N/A	N/A	N/A	• There is unlikely to be any net change to existing bank, riparian and floodplain structure and connectivity with channel	No upstream water bodies					

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen																
Appropriate techniques (invasive species)	-	-	Predicted change to status elements (green = none, amber = possible, red = likely)	-	-	-	• Measures are likely to become more difficult to implement at the crossing location • Development opportunity should be used to implement measures elsewhere. If this takes place future status will not be inhibited and it will help objectives to be achieved • Scale of this particular crossing means there is unlikely to be a proportional opportunity to implement significant wider water body improvements, but opportunities must be investigated	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	• Measures are likely to become more difficult to implement at the crossing location • Development opportunity should be used to implement measures elsewhere. If this takes place future status will not be inhibited and it will help objectives to be achieved • Scale of this particular crossing means there is unlikely to be a proportional opportunity to implement significant wider water body improvements, but opportunities must be investigated	-	No effect on implementation of mitigation measures.	-	-	No effect on implementation of mitigation measures.	
Appropriate timing (vegetation control)	-	-		-	-	-		-	-				-	No effect on implementation of mitigation measures.	-	-	No effect on implementation of mitigation measures.	
Appropriate vegetation control technique	-	-		-	-	-		-	-				-	No effect on implementation of mitigation measures.	-	-	No effect on implementation of mitigation measures.	
Selective vegetation control regime	-	-		-	-	-		-	-				-	No effect on implementation of mitigation measures.	-	-	No effect on implementation of mitigation measures.	
Set-back embankments	-	-		-	-	-		-	-				-	No effect on implementation of mitigation measures.	-	-	No effect on implementation of mitigation measures.	
Flood bunds (earth banks, in place of floodwalls)	-	-		-	-	-		-	-				-	No effect on implementation of mitigation measures.	-	-	No effect on implementation of mitigation measures.	
Educate landowners on sensitive management practices (urbanisation)	-	-		-	-	-		-	-				-	No effect on implementation of mitigation measures.	-	-	No effect on implementation of mitigation measures.	
Operational and structural changes to locks, sluices, weirs, beach control, etc.	-	-		-	-	-		-	-				-	No effect on implementation of mitigation measures.	-	-	No effect on implementation of mitigation measures.	
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	-	-		-	-	-		-	-		• Opportunity to implement this measure if new habitats are created		-	Potential to enhance/implement identified mitigation measures, due to modification and diversion of a tributary.	-	-	Potential to enhance/implement identified mitigation measures, due to modification and diversion of a tributary.	
Structures or other mechanisms in place and managed to enable fish to access waters upstream and downstream of the impounding works	-	-		-	-	-		-	-		• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated		-	No effect on implementation of mitigation measures.	-	-	No effect on implementation of mitigation measures.	
Improve floodplain connectivity	-	-		-	-	-		-	-		• Opportunity to implement this measure if new habitats are created		-	Potential to enhance/implement identified mitigation measures, due to modification and diversion of a tributary.	-	-	Potential to enhance/implement identified mitigation measures, due to modification and diversion of a tributary.	
Alteration of channel bed (within culvert)	-	-		-	-	-		-	-		• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated		-	No effect on implementation of mitigation measures.	-	-	No effect on implementation of mitigation measures.	
Re-opening existing culverts	-	-		-	-	-		-	-				-	No effect on implementation of mitigation measures.	-	-	No effect on implementation of mitigation measures.	
Preserve and, where possible, restore historic aquatic habitats	-	-		-	-	-		-	-		• Opportunity to implement this measure if new habitats are created		-	Potential to enhance/implement identified mitigation measures, due to modification and diversion of a tributary.	-	-	Potential to enhance/implement identified mitigation measures, due to modification and diversion of a tributary.	
Removal of hard bank reinforcement / revetment, or replacement with soft engineering solution	-	-		-	-	-		-	-		• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated		-	No effect on implementation of mitigation measures.	-	-	No effect on implementation of mitigation measures.	

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Viaduct - Grand Union Canal Viaduct (footings in or within riparian zone of watercourse)					Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
	GB70610252			Description of scheme element impact	*Construction of piers and footings next to canal for Viaduct over Grand Union Canal (SWC-CFA7-1)*							Construction	Operation		
	Grand Union Canal, Maple Lodge to Uxbridge	Moderate	Good Ecological Potential by 2015	Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms			Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	-	-		- Receptor is insensitive to impact.	No footings in watercourse.	- No baseline data available on macrophyte communities in the canal. - There may be minor changes in the cover and composition of macrophyte communities, but this is not considered to be greater than a minor localised change.	No anticipated effects on hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on macrophytes.	None identified.	ly minor and localised effects anticipated, no effect on WFD eleme	None required.	None required.	Minor and localised effects	-
	3. Macroinvertebrates	-	-		- Receptor is insensitive to impact.	No footings in watercourse.	- Fish (no baseline data available) may be slightly altered due to shading effects on macrophytes if macrophytes constitute a significant component of invertebrate habitat at this location , but this is considered to be localised and minor at the very worst.	No anticipated effects on hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on macroinvertebrates.	None identified.	ly minor and localised effects anticipated, no effect on WFD eleme	None required.	None required.	Minor and localised effects	-
	4. Fish	-	-		- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). - There were no baseline fish surveys, but fish habitat assessment indicated poor fish habitat quality in the canal. - Effects are likely to be temporary and localised.	No footings in watercourse.	- Fish (no baseline data available) may be slightly altered due to shading effects on macrophytes if macrophytes constitute a significant component of fish habitat at this location , but this is considered to be localised and minor at the very worst.	No anticipated effects on hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on fish.	None identified.	ly minor and localised effects anticipated, no effect on WFD eleme	None required.	None required.	Minor and localised effects	-
	Physico-Chemical status														
WFD classification elements	5. Dissolved Oxygen	Good	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	None identified.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	No significant effects	-
	6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	None identified.					
	7. Phosphate	Poor	-		N/A	N/A	N/A	ectively an open span bridge, so there would be no	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	None identified.					
	8. Ammonia	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	None identified.					
	9. Temperature	-	-		N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	None identified.					
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	None identified.					
	Hydromorphological status														**Hydromorphology baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	None identified.	No effects on hydromorphology anticipates, due to insignificant changes in hydromorphological regime.	N/A	N/A	No significant effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	None identified.		N/A	N/A		
	13. River continuity	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	None identified.		N/A	N/A		
	14. River depth and width variation bed	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	None identified.		N/A	N/A		
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	None identified.		N/A	N/A		
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	None identified.		N/A	N/A		

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen												
Manage disturbance	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	No effects identified.	None required.	None required.	No significant effects	-
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	-	-		Some loss of bankside habitat due to construction of viaduct					None identified.	Potential minor and localised effects.	None required.	None required.	Minor and localised effects	-
Avoid the need to dredge (e.g. minimise under-keel clearance; use fluid mud navigation; flow manipulation or training works)	-	-		-	-	-	-	-	-	No effects identified.	None required.	None required.	No significant effects	-
Prepare a dredging / disposal strategy	-	-		-	-	-	-	-	-		None required.	None required.		
Reduce impact of dredging	-	-		-	-	-	-	-	-		None required.	None required.		
Reduce sediment resuspension	-	-		-	-	-	-	-	-		None required.	None required.		
Alter timing of dredging / disposal	-	-		-	-	-	-	-	-		None required.	None required.		
Bank rehabilitation / reprofiling	-	-		-	-	-	-	-	-		None required.	None required.		
Site selection (dredged material disposal) (e.g. avoid sensitive sites)	-	-		-	-	-	-	-	-		None required.	None required.		
Awareness raising / information boards (boat wash / sources of fine sediment)	-	-		-	-	-	-	-	-		None required.	None required.		
Phased de-watering and other techniques	-	-		-	-	-	-	-	-		None required.	None required.		
Selective vegetation control regime	-	-		-	-	-	-	-	-		None required.	None required.		
Appropriate vegetation control technique	-	-		-	-	-	-	-	-		None required.	None required.		
Appropriate timing (vegetation control)	-	-		-	-	-	-	-	-		None required.	None required.		
Modify vessel design	-	-		-	-	-	-	-	-		None required.	None required.		
Vessel Management	-	-		-	-	-	-	-	-		None required.	None required.		
Sediment management	-	-		-	-	-	-	-	-		None required.	None required.		

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Colne Valley Viaduct CFA7-SWC3 - River Colne crossing					River Diversion of River Colne			Colne Valley Viaduct CFA7-SWC3 - Newyears Green Bourne crossing					River Diversion - Newyears Green Bourne			Culvert - tributaries				
GB106039075090			Description of scheme element impact	Approximately 3.4km long viaduct of up to 15.5m high with piers close to banks edge. Minor narrowing of channel where viaduct crosses river.					Diversion of approximately 160m to the River Colne to avoid a viaduct pier being located in the river.			Approximately 3.4km long viaduct of up to 15.5m high with piers close to banks edge crossing Newyears Green Bourne, a tributary of the River Colne.					A Road Crossing (CFA7-SWC-5) will incorporate two meandering bends (approximately 10m either side of existing channel) as			Culvert on tributary of of the River Colne near Weydonmills Cottage				
Colne and GLIC (from confluence with Chess to Ash)	Poor	Good Ecological Potential by 2027	Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Habitat creation	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
Fisheries	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WFD Quality Elements	C. Macrophytes and phytobenthos - macrophytes	-	-	Predicted change to status elements (green = none, amber = possible, red = likely)	Receptor is insensitive to impact	Viaduct footings will be close to river bank, and may result in the permanent loss of macrophytes in the section beneath the viaduct. Effect considered to be minor and localised.	Viaduct will be 15.5m above water body. There is the potential for shading to affect the composition of macrophytes communities beneath the viaduct, but this is not considered to be greater than a minor localised change.	Minor channel narrowing for a short stretch beneath and adjacent to the viaduct piers. Localised disturbance and may lead to some erosion of marginal macrophyte beds. There will also be loss of wet woodland habitat adjacent to the west bank of the R Colne	No impact. Runoff will be collected by drainage to balancing pond.	There will be loss of marginal and channel macrophytes over the 160m length of the existing R Colne that lies within the diverted section. None of the species recorded are rare or notable, and it is anticipated that the macrophyte community will re-establish within 1 to 3 years of completion of the diversion. Effect is considered to be minor.	The new channel will incorporate marginal berms to provide habitat for macrophytes and as such the channel will include a range of habitats suitable for colonisation by submerged species. The effect on this quality element is considered to be minor positive.	Diversion would reflect or improve upon the existing sinuosity of the channel. No negative or positive impacts anticipated on hydromorphological quality elements and therefore no effects on macrophyte communities.	Receptor insensitive to impact	Aerial photograph analysis suggests that there is little to no presence of terrestrial vegetation and macrophytes are absent. No effect anticipated.	Channel is currently heavily shaded by terrestrial vegetation. No effect anticipated.	No effect anticipated as macrophytes likely to be absent.	No effect anticipated as macrophytes likely to be absent.	Loss of existing watercourse is considered to be a minor negative effect as the macrophytes are unlikely to be present.	The diversion will incorporate features such as meanders and marginal berms, and will be set for shaded, offering increased opportunities for macrophyte colonisation.	Replacement flood storage will be provided at the edge of Newyears Green Bourne floodplain which will ensure that downstream flows within the Bourne are not changed significantly from the existing watercourse. No hydromorphological impacts are predicted therefore no effects on macrophytes are anticipated.	No effect anticipated	There would be permanent loss of macrophytes within the culverted section. Although the effect is considered to be minor as the macrophyte habitat represents a small proportion of the overall length of the tributaries. The effect is therefore considered to be localised and therefore minor.	Macrophyte cover will be permanently lost from the section within the river. No macrophyte data was available for the ditch.	No effect anticipated. Culvert will be designed to maintain continuity of hydromorphological regime.	
	D. Macroinvertebrates	Good	-		Receptor is insensitive to impact	Viaduct footings will be close to river bank, and will result in the loss of marginal or channel habitats which may be important for macroinvertebrates. Effect considered to be minor and localised.	Macroinvertebrate community beneath viaducts may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor.	Fish foraging habitat beneath the viaducts may be reduced due to shading effects on macrophyte and macroinvertebrate communities, but this is considered to be localised and minor.	Increase in flow velocity may improve any gravel substrates which are currently at risk of sedimentation, thus improving habitat for macroinvertebrates. Considering the low presence of rheophilic (moderate/fast flow) taxa this could be positive. However, some channel may be subject to increased scour with potential negative impacts on invertebrates. Based on a precautionary assessment the overall effect is considered to be minor negative.	No impact. Runoff will be collected by drainage to balancing pond.	There will be loss of the macroinvertebrate community within the existing R Colne channel, although the new channel will have established prior to loss of the existing. The existing community includes an assemblage characteristic of fast to good water quality habitats, with a relatively high proportion of pollution sensitive Ephemeroptera, Plecoptera and pollution sensitive caddis flies (Leptoceridae), sometimes in high numbers.	The river diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrates taxa that currently characterise the reach.	No hydromorphological effects anticipated and therefore no effect on macroinvertebrate communities.	Receptor insensitive to impact	Bridge footings will not be located the diverted channel. Macroinvertebrate community likely to be limited as channel appears to dry periodically.	Channel is currently heavily shaded by terrestrial vegetation. No effect anticipated.	Existing flow regime likely to be highly variable and strongly influenced by rainfall events. No changes anticipated as viaduct footings are outside channel.	CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality within the ditch.	Loss of existing watercourse is considered to be a minor negative effect on the macroinvertebrate community.	The river diversion will offer a greater diversity of macroinvertebrate habitats than the existing channel.	No hydromorphological impacts are predicted therefore no effects on macroinvertebrates are anticipated.	No effect anticipated	There would be temporary loss of macroinvertebrate habitat during construction. The new channel will be designed with a lowered berm to allow a natural substrate to be recreated within them the overall effect is considered to be minor and localised.	Insensitive to shading, but lots of macrophyte cover will limit value of section directly affected by shading.	No effect anticipated	CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality within the ditch.
	K. Fish	Poor	-		Noise and vibration may cause minor, localised disturbance to fish. Any incorporation of sediment could affect gravel habitats, though fish suggests that have gravel habitats are not present. Effects are thus considered to be minor.	Viaduct footings will be close to river bank, and will result in the loss of marginal or channel habitats which may be important for fish. Effect considered to be minor and localised.	Fish foraging habitat beneath the viaducts may be reduced due to shading effects on macrophyte and macroinvertebrates communities, but this is considered to be localised and minor.	No spawning habitat is considered to be present, and species recorded (Barbel, chub, perch and bullhead) not considered to be sensitive to changes in velocity and localised increases in flow velocity.	No impact. Runoff will be collected by drainage to balancing pond.	There will be loss of fish habitats within the existing R Colne channel. The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities.	No hydromorphological effects anticipated and therefore no effect on fish community	No fish data available for this reach of the watercourse due to lack of access permission, but aerial photograph analysis suggests that the channel is narrow (less than 2m wide) and dominated by terrestrial vegetation and therefore may dry periodically. Fish community considered to be limited, and therefore no measurable effect anticipated	No effect anticipated as piers will not be located within the channel and fish community likely to be limited.	Channel is currently heavily shaded by terrestrial vegetation. No effect anticipated.	Existing flow regime likely to be highly variable and strongly influenced by rainfall events. No changes anticipated as viaduct footings are outside channel.	CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality within the ditch.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities.	No hydromorphological impacts are predicted therefore no effects on fish are anticipated.	No data is available for this tributary watercourse. However, based on survey data for the Colne, tributary may support barbel, chub, bullhead, brook lamprey and dace. Noise and localised disturbance to fish during period in which culvert is being constructed.	There will be temporary loss of habitat during construction, although current measures outlined in the CoCP will be used to limit impacts on fisheries during construction.		
Physico-Chemical status																								
WFD Quantitative elements	G. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. CoCP measures (Section 10) implemented during construction will ensure potential impacts to water quality are reduced to minor/temporary impacts with negligible effect.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. CoCP measures (Section 10) implemented during construction will ensure potential impacts to water quality are reduced to minor/temporary impacts with negligible effect.	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. CoCP measures (Section 10) implemented during construction will ensure potential impacts to water quality are reduced to minor/temporary impacts with negligible effect.	N/A	N/A	There is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
	H. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	I. Phosphate	Poor	-		N/A	N/A	N/A	Is effectively an open span bridge, so there would be no impact on phosphate.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	Receptor is insensitive to impact	• Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. CoCP measures (Section 10) implemented during construction will ensure potential impacts to water quality are reduced to minor/temporary impacts with negligible effect.	N/A	N/A	N/A	Is effectively an open span bridge, so there would be no impact on phosphate.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	Receptor is insensitive to impact	• Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. CoCP measures (Section 10) implemented during construction will ensure potential impacts to water quality are reduced to minor/temporary impacts with negligible effect.	N/A	N/A	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects.	Receptor is insensitive to impact
	J. Ammonia	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	N. Temperature	High	-		N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	There is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact
	O. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	N/A	N/A	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effects.	N/A	N/A	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
Hydromorphological status																								
WFD Quantitative elements	M. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	N/A	• Footings would be close to the watercourse and could cause local turbulence in riparian zones during peak flow events • This is unlikely to significantly affect hydromorphology	N/A	• Proposed realignment would be short and would replicate sinuosity in 500m reach immediately upstream • Increasing channel sinuosity from the existing relatively straight form would increase morphological diversity • No significant impacts anticipated • It is difficult to judge how beneficial the diversion would be, but on the balance of increased sinuosity against the likely need for bank stabilisation to define the new flow path, the diversion is not considered with confidence to have beneficial or detrimental effects	N/A	N/A	• Footings would be close to the watercourse and could cause local turbulence in riparian zones during peak flow events • This is unlikely to significantly affect hydromorphology	N/A	• The extent of new watercourse that would be created, and the possible negative effects of this, is considered to be minor/localised and there would be no significant habitat creation	• Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics • Newyear's Green Bourne is a minor tributary of the River Colne and therefore the catchment is a small area of the wider catchment • Lengthening the channel may reduce flow rates although the diversion is not far from the existing channel, so the impact is small • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of lengthening the watercourse will needs to be flagged as a risk	N/A	N/A	N/A	• Unclear where culvert on tributaries to • The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out-of-bank flows would be cut-off and current boundaries would be smooth compared to natural banks and vegetated channel. There is also likely to be homogenised flow patterns and increased flow velocities due to increased channel gradient and smooth channel bed • The tributaries to the River Colne are effectively drainage ditches within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A
	O. Connection to Groundwater	-	-		N/A	N/A	N/A	• Not significant to hydromorphology	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	• Not significant to hydromorphology	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	• 1 likely to be no significant relationship between hydromorphology and groundwater	N/A
	P. River continuity	-	-		N/A	N/A	N/A	• Viaduct piers could interrupt riparian zone continuity, but not considered to be a significant risk	N/A	• Proposed realignment would be short and would replicate sinuosity in 500m reach immediately upstream • No significant impacts anticipated	N/A	N/A	N/A	• Viaduct piers could interrupt riparian zone continuity, but not considered to be a significant risk	N/A	N/A	• The diversion would replicate existing channel characteristics, and there is not considered to be any significant change in river continuity	N/A	N/A	N/A	• Flow is unlikely to be significantly altered as channel storage and reduced floodplain connectivity, but the size of the channel means that any effects on the diversion that continues to convey flow to be significantly affected	N/A	N/A	N/A	• Out-of-bank flows would be severed by the culvert, and in channel flows may become more uniform. There is also likely to be some loss of channel storage and reduced floodplain connectivity. • The size of the channel suggests that there would not be significant loss of diversity in river depth and width	N/A
	Q. River depth and width variation	-	-		N/A	N/A	N/A	• Channel width and depth appears to be diverse, and the viaduct would have no significant effect	N/A	• Some localised scour of the bed and banks is likely, although this would promote morphological diversity rather than causing ecological deterioration • Bank protection may be necessary to protect non-channel assets, which could trigger further loss of bank habitat and offset to the equilibrium of the sediment regime • On balance, the effects cannot be described as detrimental or beneficial	N/A	N/A	• Channel width and depth appears to be diverse, and the viaduct would have no significant effect	N/A	N/A	• Channel width and depth appears to be diverse, and the viaduct would have no significant effect	N/A	N/A	• Lengthening a channel tends to reduce flow rates and increase deposition of sediment • Given the size of the watercourse there would probably be no measurable impact	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport in scour • If the current pipe is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A
	Q. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• Bed forms are unlikely to be significantly affected by the viaduct	N/A	• Some diversity of bed forms can be observed from aerial imagery, and replicating the upstream channel form is likely to sustain this	N/A	N/A	N/A	• Bed forms are unlikely to be significantly affected by the viaduct	N/A	N/A	• Lengthening a channel tends to reduce flow rates and increase deposition of sediment • Given the size of the watercourse there would probably be no measurable impact	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport in scour • If the current pipe is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A
	R. Structure of riparian zone	-	-		N/A	N/A	N/A	• Footings in the riparian zones would cause some loss and obstruction to riparian zone, but relative to the area of open space this would probably be insignificant	N/A	• No net change to existing bank, riparian and floodplain structure and connectivity with channel	N/A	N/A	N/A	• Footings in the riparian zones would cause some loss and obstruction to riparian zone, but relative to the area of open space this would probably be insignificant	N/A	N/A	• Although channel capacity would increase, there is likely to be no net change to existing bank, riparian and floodplain structure and connectivity with channel.	N/A	N/A	N/A	• The culvert would disconnect the channel from its floodplain, and would also act as a key crossing riparian, habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (or may be beneficial or confirmed as significant)	Where RBMP measure will happen	When RBMP measure will happen																						
Reduce sediment resuspension	-	In place	Predicted change to status elements (green = none, amber = possible, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bank rehabilitation / reprofiling	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Flood bunds (earth banks, in place of flood walls)	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Set back embankments	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Avoid the need to dredge (e.g. minimise under-keel clearance, use fluid mud navigation, flow manipulation or training works)	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Reduce impact of dredging	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alter timing of dredging / disposal	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sediment management	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Site selection (dredged material disposal) (e.g. avoid sensitive sites)	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phased de-watering and other techniques	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selective vegetation control regime	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Appropriate vegetation control technique	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Appropriate timing (vegetation control)	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Appropriate techniques (invasive species)	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Awareness raising / information boards (boat wash / sources of fine sediment)	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manage disturbance	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Prepare a dredging / disposal strategy	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Modify vessel design	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vessel Management	-	In place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	-	Not In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Removal of hard bank reinforcement and where, in replacement with soft engineering solution	-	Not In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Preserve and, where possible, restore historic aquatic habitats	-	Not In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Re-opening existing culverts	-	Not In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alteration of channel bed (within culvert)	-	Not In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Structures or other mechanisms in place and managed to enable fish to access waters upstream and downstream of the impounding weir	-	Not In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Operational and structural changes to locks, sluices, weirs, beach control, etc.	-	Not In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Remove obsolete structure	-	Not In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Educate landowners on sensitive management practices (urbanisation)	-	Not In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Improve floodplain connectivity	-	Not In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Colne Valley Viaduct - Grand Union Canal crossing					Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB106039023050			Description of scheme element impact	Approximately 3.4km long viaduct of up to 15.5m high with piers close to banks edge crossing Grand Union Canal. The viaduct span was increased to prevent the need for a viaduct pier in the canal.							Construction	Operation		
Colne and GLIC (from confluence with Chess to Ash)	Poor	Good Ecological Potential by 2027		Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitat (sediment and disturbance)	Drainage						
Identified biological impacts				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Fisheries	N/A	N/A	Predicted change to status elements (green = none, amber = possible, red = likely)											
C. Macrophytes and phytobenthos - macrophytes	-	-		Receptor insensitive to impact	Viaduct footings will be close to canal bank edge and therefore temporary minor loss of marginal macrophyte cover may occur during construction	Viaduct will be 15.5m above water body. Shading is unlikely to result in any change in composition of macrophyte communities beneath the viaduct, but this is not considered to be greater than a minor localised change.	Receptor insensitive to impact	CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality within the ditch.	Upstream water bodies not impacted by scheme	There will be temporary loss of macrophyte cover on the R Colne whilst vegetation in the river diversion establishes. Net loss will be minimised if the diversion can be established before the existing channel is cut off. There will be permanent loss of macrophytes within the culverted sections of tributaries due to the new culverts. Overall, this is a short section of river and is not considered to affect overall status class for this quality element.	No additional mitigation required	No additional mitigation required	Minor and localised effects	
D. Macroinvertebrates	Good	-		Receptor insensitive to impact	No macroinvertebrate data available. Temporary loss of marginal macrophyte cover may have minor, localised effect on macroinvertebrate community.		Receptor insensitive to impact	CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality within the ditch.	Upstream water bodies not impacted by scheme	There will be temporary loss of macroinvertebrates and macroinvertebrate habitat from the existing R Colne channel. The river diversions will be designed to maximise the length of river channel and provide a range of in-channel bank habitat and macrophyte cover (which represents macroinvertebrate habitat within the one culverted section on the un-named tributary close to Wadesworth Cottage. Despite the habitat creation measures there remains a risk that the most water quality sensitive components of the community may be lost, albeit temporarily until the river diversions are fully established.	Baseline survey of R. Colne water body to be required by the scheme to be undertaken prior to construction to establish macroinvertebrate baseline, and monitoring to be undertaken during the construction period. Priority will be given to the design of the river diversions to allow the maximum opportunity for establishment of vegetation prior to removal of existing river reach.		Risk of deterioration will depend on the outcome of baseline surveys, and phasing of river diversion works.	-
H. Fish	Poor	-		Minor redistribution of fish communities may occur during construction	Minor redistribution of fish communities may occur during construction		Receptor insensitive to impact	CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality within the ditch.	Upstream water bodies not impacted by scheme	There will be temporary loss of fish foraging habitat on the R Colne whilst the river diversions establish. Migratory routes for fish will be maintained by retaining the existing channel whilst the river diversions are created, and maintaining the connectivity between the channels at the ends. Overall, given the relatively low sensitivity of the existing population the overall effect on this quality element is considered to be minor and localised.	No additional mitigation required	No additional mitigation required	Minor and localised effects	
Physico-Chemical status														
G. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	Upstream water bodies not impacted by scheme	Implementation of CoCP measures (Section 10) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Given the temporary nature of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and treated via sustainable drainage systems (SuDS) and oil interceptors (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	No additional mitigation required	No additional mitigation required	No significant impacts predicted	-
H. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream water bodies not impacted by scheme					
I. Phosphate	Poor	-		N/A	N/A	N/A	Is an open span bridge, so there would	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	Upstream water bodies not impacted by scheme					
K. Ammonia	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream water bodies not impacted by scheme					
N. Temperature	High	-		N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream water bodies not impacted by scheme					
Ob. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	Upstream water bodies not impacted by scheme					
Hydromorphological status														**Hydromorphology Baseline**
10. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings. • Overall, there would probably be no hydromorphological impact	N/A	Upstream water bodies not impacted by scheme	• The existing water body is a HMWB and is constrained in a narrow corridor due to gravel isles • The channel is sinuous, and the proposed short diversion to ensure there are no bridge piers in the channel appears to replicate sinuosity immediately upstream • There are considered to be no significant morphological effects	No additional mitigation required	No additional mitigation required	No significant impacts predicted	• water body is a designated HMWB • Channel is immediately adjacent to Broadwater Lake Nature Reserve, so space for mitigation is very limited, unless options to connect the river and lake are considered. • Some space may be available in woodland areas to the west of the channel (and to the east of the A412) • Channel is sinuous to a degree, but this is controlled because of its proximity to the lake • Map from the mid 1900s shows that channel planform has not changed significantly over the last 100 years • Some diversity of bed forms can be observed from aerial imagery, e.g. pools and riffles •Vegetated islands appear to be present in the channel aligned with bridge piers for the Moorland Road crossing
10. Connection to Groundwater	-	-		N/A	N/A	N/A		N/A	Upstream water bodies not impacted by scheme					• Viaduct not significant to hydromorphology
10. River continuity	-	-		N/A	N/A	N/A		N/A	Upstream water bodies not impacted by scheme					• No structures visible in the channel from aerial imagery in the local area • Riparian zones appear to well established mature vegetation • Floodplain is presumably disconnected or heavily regulated by water level management for lakes, but this is not clear from initial observations
10. River depth and width variation	-	-		N/A	N/A	N/A		N/A	Upstream water bodies not impacted by scheme					• Channel depth generally heterogeneous due to sinuosity, meanders and bars • Width is also variable, and riffles are apparent in wide channel reaches. • Channel appears over-wide in places, which may be due to engineering for flood risk benefit.
10. Structure and substrate of river bed	-	-		N/A	N/A	N/A		N/A	Upstream water bodies not impacted by scheme					• Low, medium, calcareous RSNAP channel type • Developed in alluvium (clay, silt, sand, gravel) and Shepperton Gravel river terrace deposits (sand and gravel). Bedrock geology (Lambeth Group) mapped at the site that would suggest an influence on channel bars. • Channel sediments likely to be gravel matrix with sands silts and clays
10. Structure of riparian zone	-	-		N/A	N/A	N/A		N/A	Upstream water bodies not impacted by scheme					• Well developed and vegetated. • Good riparian connectivity

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	Predicted change to status elements (green = none, amber = possible, red = likely)											
Reduce sediment resuspension	-	In place		-	-	-	-	-	-	Construction of the viaduct footing adjacent to the R Colne, and diversions of the R Colne and Newyears Green Brook will result in temporary increases in resuspension. Construction of the culvert on the unnamed tributary of the Colne near Wadsworth Cottage may also cause some minor sediment resuspension. Narrowing of the R Colne may result in additional erosion, although this is considered to be minor for hydromorphological mechanisms. Overall, the effect is considered to be minor and localised, and limited to the duration during the construction stage of the project.	-	-		
Bank rehabilitation / reprofiling	-	In place		-	-	-	-	-	-	The construction of viaduct footings close to the bank edge on the R Colne would prevent bank rehabilitation in this section. Overall, this is a short section of bank and is not expected to prevent the overall water body from achieving GEP.	-	-		
Flood bunds (earth banks, in place of flashwalls)	-	In place		-	-	-	-	-	-	No effect	-	-		
Set back embankments	-	In place		-	-	-	-	-	-	The construction of viaduct footings close to the bank edge on the R Colne would prevent set back of embankments in this section. Overall, this is a short section of bank and is not expected to prevent the overall water body from achieving GEP.	-	-		
Avoid the need to dredge (e.g. minimise under keel clearance, use fixed mud navigation, flow manipulation or training works)	-	In place		-	-	-	-	-	-	No effect	-	-		
Reduce impact of dredging	-	In place		-	-	-	-	-	-	No effect	-	-		
Alter timing of dredging / disposal	-	In place		-	-	-	-	-	-	No effect	-	-		
Sediment management	-	In place		-	-	-	-	-	-	Minor narrowing of the R Colne will increase flow velocities and may assist in measures to de-silt channel	-	-		
Site selection (dredged material disposal) (e.g. avoid sensitive sites)	-	In place		-	-	-	-	-	-	No effect	-	-		
Phased de-watering and other techniques	-	In place		-	-	-	-	-	-	No effect	-	-		
Selective vegetation control regime	-	In place		-	-	-	-	-	-	No effect	-	-		
Appropriate vegetation control technique	-	In place		-	-	-	-	-	-	No effect	-	-		
Appropriate timing (vegetation control)	-	In place		-	-	-	-	-	-	No effect	-	-		
Appropriate techniques (invasive species)	-	In place		-	-	-	-	-	-	The invasive macrophyte species floating pennywort (Hydrocotyle ranunculoides) is widespread throughout this reach. Disturbance to the bed has the potential to cause the spread of this species. However, the plant is widespread throughout the R Colne system. Increased flow velocities as a result of narrowing the river through the viaduct may help reduce the abundance of pennywort.	-	-		
Awareness raising / information (leaflet,Brief wash / sources of fine sediment)	-	In place		-	-	-	-	-	-	No effect	-	-		
Manage disturbance	-	In place		-	-	-	-	-	-	No effect	-	-		
Prepare a dredging / disposal strategy	-	In place		-	-	-	-	-	-	No effect	-	-		
Modify vessel design	-	In place		-	-	-	-	-	-	No effect	-	-		
Vessel Management	-	In place		-	-	-	-	-	-	No effect	-	-		
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	-	Not In Place		-	-	-	-	-	-	The river diversions on the R Colne and Newyears Green Brook will offer the opportunity for new habitat creation within the channel and riparian zone.	-	-		
Removal of hard bank reinforcement and where necessary replacement with soft engineering solution	-	Not In Place		-	-	-	-	-	-	Placement of R Colne viaduct footing will prevent removal of hard bank reinforcement in this section. Overall, this is a short section of bank and is not expected to prevent the overall water body from achieving GEP.	-	-		
Preserve and, where possible, restore historic aquatic habitats	-	Not In Place		-	-	-	-	-	-	Placement of viaduct footing will prevent restoration of historic bank (but not channel) habitats in this location. Overall, this is a short section of bank and is not expected to prevent the overall water body from achieving GEP.	-	-		
Re-opening existing culverts	-	Not In Place		-	-	-	-	-	-	A new culvert will be constructed on the un named tributary of the R Colne near Wadsworth Cottage. Culverts will be designed with a reduced bed level so that natural substrate can be incorporated within the culvert, and the environmental benefits of this culvert will be greater than the existing culvert. Given these design measures and the small section of a tributary watercourse that will be affected, the overall effect is considered to be minor.	-	-		
Alteration of channel bed (within culvert)	-	Not In Place		-	-	-	-	-	-	No effect	-	-		
Structures or other mechanisms in place and managed to enable fish to ascend waters upstream and downstream of the impounding	-	Not In Place		-	-	-	-	-	-	No effect	-	-		
Operational and structural changes to locks, sluices, weirs, beach control, etc.	-	Not In Place		-	-	-	-	-	-	No effect	-	-		
Remove obsolete structure	-	Not In Place		-	-	-	-	-	-	No effect	-	-		
Educate landowners on sensitive management practices (urbanisation)	-	Not In Place		-	-	-	-	-	-	No effect	-	-		
Improve floodplain connectivity	-	Not In Place		-	-	-	-	-	-	No effect	-	-		

A. Risk screening of potential to cause deterioration of current WFD status

	Surface Water body	Current status	Status objective	Scheme Elements	Chiltern Tunnel				Chiltern Tunnel				Impacts from other WFD water bodies (assessed separately)	OVERALL impact on element	Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	-
	GB106039029830	Poor	Good Ecological Potential by 2027	Description of scheme element impact	The proposed tunnel is 13,472m in length, crossing underneath the Misbourne in 2 locations, south east of Chalfont St Giles and Shardeloes Lake. A minimum cover between the river bed and the tunnel crown will be developed at the detailed design stage to minimise the risk of hydraulic pathways developing.				The proposed tunnel is 13,472m in length, crossing underneath the non designated Shardeloes Lake.						Construction	Operation		
	Misbourne			Identified biological impacts	Noise and Vibration	Drainage	Settlement of ground leading to enhancement of fractures and increased vertical permeability	Landtake (for slab or other surface infrastructure overlaying tunnel)	Noise and Vibration	Drainage	Settlement of ground leading to enhancement of fractures and increased vertical permeability	Landtake (for slab or other surface infrastructure overlaying tunnel)						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	Not assessed	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No upstream water body		N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	-	-		Receptor insensitive to impact	PSI score indicated that watercourse is sedimented, and therefore relatively insensitive to minor increases as a result of construction. Nonetheless, CoCP measures will mitigate for any silty discharges during construction.	No EA macrophyte data available. River corridor survey undertaken for HS2 recorded well developed marginal emergent macrophyte beds including reed sweet grass (*Glyceria maxima*) and common reed (Phragmites australis). Submerged macrophytes (Ranunculus sp) and marginal species (Water mint: Mentha aquatica) also recorded. Risk of settlement occurring is considered to be very low, and would be mitigated, therefore effects on biological receptors considered to be neutral.	Risk of fractures occurring is considered to be very low and any bed sealing would be localised. Given risk of impact occurring and extent of any bed sealing effect is considered to minor and localised.	Receptor insensitive to impact	PSI score indicated that watercourse is sedimented, and therefore relatively insensitive to minor increases as a result of construction. Nonetheless, CoCP measures will mitigate for any silty discharges during construction.	No EA macrophyte data available. River corridor survey undertaken for HS2 recorded well developed marginal emergent macrophyte beds including reed sweet grass (*Glyceria maximo*) and common reed (Phragmites australis). Submerged macrophytes (Ranunculus sp) and marginal species (Water mint: Mentha aquatica) also recorded. Minor changes in water level may give rise to localised changes in distribution and relative abundance of marginal and channel macrophytes.	Risk of fractures occurring is considered to be very low and any bed sealing would be localised. Given risk of impact occurring and extent of any bed sealing effect is considered to minor and localised.	No upstream water body	No EA macrophyte data available but river corridor survey recorded well developed marginal emergent macrophyte beds. Effects are associated with possible settlement of the river bed leading to risk of fractures and loss of flow. Risk of effect occurring is considered to be very low and mitigation would be targeted at affected area. Overall, effect is consider to be minor and localised.	None required.	None required.	Minor and localised effects	-
	3. Macroinvertebrates	Good	-		Receptor insensitive to impact	PSI score indicated that watercourse is sedimented, and therefore relatively insensitive to minor increases as a result of construction. Nonetheless, CoCP measures will mitigate for any silty discharges during construction.	River Misbourne is ephemeral and dries up periodically. This is reflected in invertebrate data which show that there are periodic declines in number of taxa and LIFE score. Risk of settlement occurring is considered to be very low, and would be mitigated, therefore effects on biological receptors considered to be neutral.		Receptor insensitive to impact	PSI score indicated that watercourse is sedimented, and therefore relatively insensitive to minor increases as a result of construction. Nonetheless, CoCP measures will mitigate for any silty discharges during construction.	River Misbourne is ephemeral and dries up periodically. This is reflected in invertebrate data which show that there are periodic declines in number of taxa and LIFE score.		No upstream water body	Macroinvertebrate community characteristic of ephemeral stream. Effects are associated with possible settlement of the river bed leading to risk of fractures and loss of flow. Risk of effect occurring is considered to be very low and mitigation would be targeted at affected area. Overall, effect is consider to be minor and localised.	None required.	None required.	Minor and localised effects	-
	4. Fish	Poor	-		No impacts are anticipated due to the depth of the tunnel	Misbourne supports community of cyprinid and coarse fish species. Relatively insensitive to minor and localised changes in water quality.	Risk of settlement occurring is considered to be very low, and would be mitigated, therefore effects on biological receptors considered to be neutral.		No impacts are anticipated due to the depth of the tunnel	Misbourne supports community of cyprinid and coarse fish species. Relatively insensitive to minor and localised changes in water quality.			No upstream water body	Misbourne supports community of cyprinid and coarse fish species. Overall, effect is consider to be minor and localised.	None required.	None required.	Minor and localised effects	-
	Physico-Chemical status																	
WFD classification elements	5. Dissolved Oxygen	Good	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	CoCP measures will control surface waters through the use of temporary drainage and attenuation ponds. Tunnel drainage will be pumped to the Chalfont St Peter and Amersham vent shafts for disposal to sewer. Minor impact with negligible effect.	N/A	N/A	N/A	CoCP measures will control surface waters through the use of temporary drainage and attenuation ponds. Tunnel drainage will be pumped to the Chalfont St Peter and Amersham vent shafts for disposal to sewer. Minor impact with negligible effect.	N/A	N/A	No upstream water body	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are considered temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	No significant effects	-
	6. pH	High	-		N/A	CoCP measures will control surface waters through the use of temporary drainage and attenuation ponds. Tunnel drainage will be pumped to the Chalfont St Peter and Amersham vent shafts for disposal to sewer. Minor impact with negligible effect.	N/A	N/A	N/A	CoCP measures will control surface waters through the use of temporary drainage and attenuation ponds. Tunnel drainage will be pumped to the Chalfont St Peter and Amersham vent shafts for disposal to sewer. Minor impact with negligible effect.	N/A	N/A	No upstream water body					-
	7. Phosphate	Poor	-		N/A	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	N/A	N/A	No upstream water body					-
	8. Ammonia	High	-		N/A	CoCP measures will control surface waters through the use of temporary drainage and attenuation ponds. Tunnel drainage will be pumped to the Chalfont St Peter and Amersham vent shafts for disposal to sewer. Minor impact with negligible effect.	N/A	N/A	N/A	CoCP measures will control surface waters through the use of temporary drainage and attenuation ponds. Tunnel drainage will be pumped to the Chalfont St Peter and Amersham vent shafts for disposal to sewer. Minor impact with negligible effect.	N/A	N/A	No upstream water body					-
	9. Temperature	-	-		N/A	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	N/A	N/A	No upstream water body					-
	10. Specific Pollutants (Annex VIII)	High	-		N/A	CoCP measures will control surface waters through the use of temporary drainage and attenuation ponds. Tunnel drainage will be pumped to the Chalfont St Peter and Amersham vent shafts for disposal to sewer. Minor impact with negligible effect.	N/A	N/A	N/A	CoCP measures will control surface waters through the use of temporary drainage and attenuation ponds. Tunnel drainage will be pumped to the Chalfont St Peter and Amersham vent shafts for disposal to sewer. Minor impact with negligible effect.	N/A	N/A	No upstream water body					-
	Hydromorphological status																	**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	The watercourse is ephemeral, but there is a low risk of settlement opening up fissures which could lead to increased vertical permeability to underlying aquifers and loss of flow, and associated flow dynamics, continuity and sediment transport or bed sedimentation. If impacts were to occur they would be minor, and to reemphasise, the risk is low.. Overall the effects are considered most likely to be negligible.	N/A	N/A	N/A	The watercourse is ephemeral, but there is a low risk of settlement opening up fissures which could lead to increased vertical permeability to underlying aquifers and loss of flow, and associated flow dynamics, continuity and sediment transport or bed sedimentation. If impacts were to occur they would be minor, and to reemphasise, the risk is low.. Overall the effects are considered most likely to be negligible.	N/A	No upstream water body	There is a low risk of small impacts on flow, but overall the likelihood of effects on hydromorphology is considered to be negligible. Local effects might occur if plugging of fractures in stream bed above tunnel were undertaken.	None required.	None required.	No significant effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A		N/A	N/A	N/A		N/A	No upstream water body					
	13. River continuity	-	-		N/A	N/A		N/A	N/A	N/A		N/A	No upstream water body					
	14. River depth and width variation bed	-	-		N/A	N/A		N/A	N/A	N/A		N/A	No upstream water body					
	15. Structure and substrate of river bed	-	-		N/A	N/A		N/A	N/A	N/A		N/A	No upstream water body					
	16. Structure of riparian zone	-	-		N/A	N/A		N/A	N/A	N/A		N/A	No upstream water body					

B. Risk screening of potential to prevent future attainment of good WFD status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Wendover Green Tunnel		Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
	GB106039030380	Moderate	Good potential by 2027	Description of scheme element impact	Minor change in base flow to nearby springs and associated streams predicted during construction. Discharge of dewatering abstractions during construction to surface water downstream of springs. Dewatering will be during construction prior to backfilling around tunnel. Spring and surface water flows potentially affected locally thus influencing surface water quality elements. CoCP and best practice for design, construction and operations reduce risks to water quality. Implementation of monitoring regime during construction.				Construction	Operation		
	Bear Brook and Wendover Brook			Identified biological impacts	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.						
WFD classification elements	1. Macrophytes and phytobenthos - diatoms	Moderate	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	-	-		Effects on flow temporary, during construction only. Therefore only localised and temporary effects anticipated.	No likely impact, discharge will be managed by CoCP.	No upstream water body.	Effects on flow temporary, during construction only. Therefore only localised and temporary effects anticipated.	None required.	None required.	N/A	
	3. Macroinvertebrates	Moderate	-		Effects on flow temporary, during construction only. Therefore only localised and temporary effects anticipated.	No likely impact, discharge will be managed by CoCP.	No upstream water body.	Effects on flow temporary, during construction only. Therefore only localised and temporary effects anticipated.	None required.	None required.	N/A	
	4. Fish	High	-		Effects on flow temporary, during construction only. Therefore only localised and temporary effects anticipated.	No likely impact, discharge will be managed by CoCP.	No upstream water body.	Effects on flow temporary, during construction only. Therefore only localised and temporary effects anticipated.	None required.	None required.	N/A	
	Physico-Chemical status											
WFD classification elements	5. Dissolved Oxygen	Moderate	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	No upstream water body.	Potential minor and temporary effects on element.	None required.	None required.	N/A	-
	6. pH	High	-		Receptor is insensitive to impact	Receptor is insensitive to impact	No upstream water body.	Receptor is insensitive to impact	None required.	None required.	N/A	
	7. Phosphate	High	-		Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	No upstream water body.	Depending on how much flow is lost, potential minor and temporary effects on element.	None required.	None required.	N/A	
	8. Ammonia	Good	-		Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates.	No upstream water body.	Potential minor and temporary effects on element.	None required.	None required.	N/A	
	9. Temperature	-	-		Receptor is insensitive to impact	Receptor is insensitive to impact	No upstream water body.	Receptor is insensitive to impact	None required.	None required.	N/A	
	10. Specific Pollutants (Annex VIII)	High	-		Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates.	No upstream water body.	Potential minor and temporary effects on element.	None required.	None required.	N/A	
	Hydromorphological status											Hydromorphology Baseline
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	• Potential reduction in channel flows during construction phase • water body is a HMWB due to Flood Protection, Land Drainage, Urbanisation, Water Regulation (impoundment release), and mitigation measures are in place for various hydraulic effects • Further reduction of flows could place aquatic habitats at increased risk, although the effects are thought to be temporary and future objectives would not be impeded	N/A	No upstream water body.	• Combination of inevitable increase in sediment due to construction and reduced flows could be detrimental flow and sediment dynamics in a catchment that is already heavily modified by water resource management. • The effects are likely to be temporary, but could still cause some local deterioration in the short term - especially if the construction phase coincides with a drought or low flow period - and risk management is required	None required.	None required.	Minor and localised effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		• Minor change in base flow to nearby springs and associated streams predicted. Discharge of dewatering abstractions during construction to surface water downstream of springs. Dewatering will be during construction prior to backfilling around tunnel.	N/A	No upstream water body.					
	13. River continuity	-	-		• Hydraulic effects would be localised. Combination of inevitable increase in sediment due to construction and reduced flows could be detrimental to bed habitat continuity and species migration	N/A	No upstream water body.					
	14. River depth and width variation bed	-	-		• Reduction of flows could decrease flow depth, wetted perimeter and hydraulic radius in a catchment that is already hydraulically modified	N/A	No upstream water body.					
	15. Structure and substrate of river bed	-	-		• Combination of inevitable increase in sediment due to construction and reduced flows could be detrimental to bed habitats	N/A	No upstream water body.					
	16. Structure of riparian zone	-	-		• Hydraulic connectivity with riparian zones could be decreased if flows are reduced, but this would be temporary and likely to have no significant effects in the medium to long term	N/A	No upstream water body.					

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	-	-	-	-	-	-	-	-	-
Appropriate techniques to align and attenuate flow to limit detrimental effects of these features (drainage)	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	• The potential effects of the cuttings on dewatering a water body that is already heavily modified due to Flood Protection, Land Drainage, Urbanisation, Water Regulation (impoundment release), means that future objectives to improve catchment water sustainability could be placed at significant risk	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Appropriate water level management strategies, including timing and volume of water moved	-	-			N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ensure the seasonal pattern of water levels during each year is managed so as to enable the establishment and retention of aquatic plant and animal communities in the shore zone of the impoundment	-	-			N/A	N/A	N/A	N/A	N/A	N/A	N/A
Ensure the rate and range of any artificial drawdown is appropriately managed to maintain aquatic plant and animal communities in the shore zones of water storage and supply with gently shelving shore zones	-	-			N/A	N/A	N/A	N/A	N/A	N/A	N/A
Re-opening existing culverts	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	River Diversion Stoke Brook and Tributaries				Culverts on Stoke Brook				Cutting		Culverts on Sedrup Ditch					Culverts on Lower Hartwell Ditches					Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	-
GB106039030320	Moderate	Good Ecological Status by 2015	Description of scheme element impact	River diversions at crossings (SWC11-SWC3 to CFA11-SWC6) will form a permanent realignment in area of St Mary's Church. Crossings require long culverts.				Crossings requiring culverts on Stoke Brook at SWC11-SWC1 to CFA11-SWC6 and CFA11-SWC18. Culvert lengths on Stoke Brook and tributaries = 60m + 47m + 58m + 77m + 40m. Total = 282m.				Wendover North Cutting - dewatering activities and other hydrological impacts on Stoke Brook upstream springs, water discharged approximately 1 km downstream of springs with potential effects on dry weather flow of upstream areas of Stoke Brook		Existing alignment of managed field drains straightened at Sedrup Ditch and tributary (Crossing CFA11-SWC7 and CFA11-SWC8). Culvert lengths on Sedrup ditch and tributaries = 187m + 150m. Total = 337m. Also includes 200m of new channel/realignment downstream.					Crossings requiring culverts on Hartwell Ditches at CFA11-SWC9 to CFA11-SWC12, including approximately 210m of diversion. Culvert lengths = 43m + 33m + 30m + 30m. Total = 136m.								
Stoke Brook Aylesbury			Identified biological impacts	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream		Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/damming of groundwater) flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage						
1. Macrophytes and phytobenthos - Diatoms	-	-	-	N/A	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No impact to upstream water bodies	No baseline data available on this element and the assessment follows a precautionary approach. Possible changes to flows due to the cuttings potentially affecting the macrophytes element in the spring fed upstream stretch of Stoke Brook and its tributaries. Other effects (from culverts/diversions etc.) likely to be minor localised.	None required.	- Measures to improve macrophyte habitat or mitigate any adverse effects form part of the embedded mitigation measures described previously, therefore no additional mitigation is required. - These include channel habitat improvements to habitat within the channels of the culverts and designing/maintaining the culverts so that bed substrate is retained. - It is important to ensure that these potential beneficial effects are maintained during the detailed design of the specific elements. - Further investigation required to assess whether the changes in flow brought about by the construction of the cutting will affect this WFD element.	None required.	No baseline data available on this element and the assessment follows a precautionary approach. Possible changes to flows due to the cuttings potentially affecting the macrophytes element in the spring fed upstream stretch of Stoke Brook and its tributaries. Other effects (from culverts/diversions etc.) likely to be minor and localised.	-
2. Macrophytes and phytobenthos - Macrophytes	-	-	-																									
3. Macroinvertebrates	-	-	-																									
4. Fish	-	-	-																									
WFD classification elements	Predicted change in status (assuming 'green = none, amber = possible, red = likely)																											
5. Dissolved Oxygen	High	-	-	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body.	N/A	N/A	Due to the length of the proposed culverts, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• Water quality could be reduced in the depleted reaches due to relatively increased water and reduced flow rates, turbulence and oxygenation.	CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	No impact to upstream water bodies	Potential minor and localised effects on element.	None required.	None required.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impact with negligible effect. In replay, compliance assessment will be undertaken to confirm this is the case. Impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a viaduct) then drainage will be collected and discharged to the water body's sequence. Where balancing ponds are required, these will be designed to incorporate the diverted channel to provide habitat and water quality improvements. Where this is not possible, then a contribution to off-site improvements will be made. Overall, the scheme will have a neutral effect on the water body as a whole.	-
6. pH	High	-	-	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No impact to upstream water bodies	Receptor is insensitive to impact			-
7. Phosphate	Moderate	-	-	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate. This impact is likely to be short/temporary in relation to timescale.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of residents contaminants, including phosphate from source and diffuse pollution.	CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	No impact to upstream water bodies	Depending on how much flow is lost, potential minor and localised effects on element. One private discharge consent (not water company).			-
8. Ammonia	High	-	-	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of residents contaminants, reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	No impact to upstream water bodies	Potential minor and localised effects on element.			-
9. Temperature	-	-	-	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of residents contaminants, reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	No impact to upstream water bodies	Receptor is insensitive to impact			-
10. Specific Pollutants (Annex VIII)	-	-	-	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of residents contaminants, reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	No impact to upstream water bodies	Potential minor and localised effects on element.			-
Hydromorphological status																												Hydromorphology Baseline
WFD classification elements	Predicted change in status (assuming 'green = none, amber = possible, red = likely)																											
11. Quantity and dynamics of river flow	-	-	-	N/A	N/A	• Channel width appears to be 2m or less, so there is unlikely to be significant diversity of fast dynamics. • It appears that watercourse would be lengthened around an embankment. Lengthening the channel would increase habitats although the diversion is not far from the existing channel course. • The impacts on flow dynamics are unlikely to be severe but the effects could still be detrimental.	N/A	N/A	N/A	• Approximately 300 m of culverts would be located in the middle of a 9.59 km water body. The water body is relatively flashy (according to online mapping), but with some sensitivity for invertebrates, which are classified as Moderate in 2012 • Extensive culverting would result in significant loss of habitat and flow dynamics. • Out of bank flows would be cut off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • The size of the channel suggests there is unlikely to be major diversity in river depth and width, but there is still a significant risk to the water body.	N/A	• Dewatering would reduce flows volumes and diversity in the headwaters. • This would be localised to approximately 1.5km of the 9.59km water body (approximately 15% of the surface water body) • The water body is currently of good status and may be sensitive to impacts. However the majority of the downstream part of the water body is heavily modified and insensitive to the channel, making the upper 3km sensitive at water body scale	N/A	N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity of flow dynamics • Shortening the channel could increase velocities, and the tendency for bed and bank scour. Flow levels could be increased downstream as the channel gradient levels, which could increase erosion potential. • Out of bank flows would be cut off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • The size of the channel is small, and in practical terms the culvert would impact a small proportion of the water body	N/A	N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity of flow dynamics • Shortening the channel could increase velocities, and the tendency for bed and bank scour. Flow levels could be increased downstream as the channel gradient levels, which could increase erosion potential. • Out of bank flows would be cut off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • The size of the channel is small, and in practical terms the culvert would impact a small proportion of the water body	N/A	No impact to upstream water bodies	• The impacts of diverting, culverting and dewatering ca 300 m of the 9.59 km, good overall status (according to online mapping) Stoke Brook could be severe, because of extensive culverts on the principal watercourse of the water body, where macroinvertebrate status is moderate and could be sensitive to hydromorphological impacts. • The culverts are likely to result in significant impacts on the water body hydromorphology that could place the overall status class at risk	Undertake hydromorphological surveys to aid detailed design development. Incorporate hydromorphological mitigation measures into detailed design where practicable. Mitigation measures might include: • Bank reprofiling (rehabilitation) • Create low flow channels in over-widened/over-deepened channels • Bed raising • Creation of shallow margin in front of bund defence • Install silt, sand or gravel traps • Introduce riparian vegetation/green corridors where space allows • Reinstate a sinuous river channel (re-meandering) where space allows • Recreation of gravel 'berm' features and installation of temporary bed structures (increase morphological diversity) • Return marginal vegetation • Use of engineering techniques to assist natural recovery • Use soft engineering techniques	• The only watercourse requiring hydromorphological baseline is Stoke Brook • Stoke Brook is a small watercourse is small (approximately 2m channel width) but is the principal watercourse of the water body, with a total length of ca. 9.5km and a catchment area of ca. 13.5 km • It is currently good overall status (according to online mapping) undeveloped part of the principal watercourse of the water body, where macroinvertebrate status is moderate and could be sensitive to hydromorphological impacts • Channel is set in a low-relief rural catchment dominated by arable agriculture with pockets of woodland • There is residential development close to the eastern side of the channel in the downstream reaches of the water body, and evidence of historic channel straightening. There are numerous existing crossings, including a ford, a railway an 'A' road and several minor roads • Channel is naturally sinuous and may have been straightened to deepened for the benefit of drainage of land gain • Map from the mid 1990s shows that channel platform has not changed significantly for at least ca. 20 years. • The channel is lined by mature vegetation, so the water surface cannot be seen from aerial imagery	• The impacts of diverting and culverting Stoke Brook could be severe, because of extensive culverts on the principal watercourse of the water body. The culverts are likely to result in adverse effects on the water body that could affect (deteriorate) its overall status class	• Channel width appears to be consistent, as would be expected for a small watercourse. Channel does not seem to be over-wide • Channel depth cannot be assessed from available data, but given the size of the watercourse is likely to be consistent
12. Connection to Groundwater	-	-	-	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	• Potential reduction in spring flows at Worlds End • Estimated 0.04 l/l/sec/m zone magnitude at estimated 0.4% of Stoke Brook	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	No impact to upstream water bodies				• Groundwater is not significant to the effects of HS2 or hydromorphology
13. River continuity	-	-	-	N/A	N/A	• Lengthening the channel around an embankment may result in reduced riparian and floodplain connectivity, even though the size of the watercourse suggests that there are unlikely to be severe effects	N/A	N/A	N/A	• The culvert would be located in the middle of the water body and would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing fine and habitat continuity in and adjacent to both sides of the channel	N/A	• Dewatering could reduce flow depths and widths, reduce connectivity in the headwaters/ connectivity, and increase sediment deposition in the upper reaches	N/A	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing fine and habitat continuity within and adjacent to both sides of the channel. • However, in water body terms, the size of the channel is small, so the culvert would not impact on deterioration of the overall water body status	N/A	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing fine and habitat continuity within and adjacent to both sides of the channel. • However, in water body terms, the size of the channel is small, so the culvert would not impact on deterioration of the overall water body status	N/A	No impact to upstream water bodies				• No structures are visible in the channel from aerial imagery of the local area, although there are several crossings and a ford • Riparian zones are continuous and appear to well established mature vegetation in the vicinity of the proposed HS2 crossing • Floodplain appears to be well connected
14. River depth and width variation	-	-	-	N/A	N/A	• The diversion would replicate existing channel geometry. Out of channel flow depths may decrease as a result of lengthening the channel, but in practical terms there would be no significant change	N/A	N/A	N/A	• Out of bank flows would be severed by the culvert, and in channel flows may become deeper than natural peak flows, and may exert scour/ange in extreme events • The culvert would exaggerate channel morphology. • Some scour may occur upstream and downstream of the structure as the river tries to regain flow and sediment regime equilibrium. This is unlikely to be severe in the context of the scale, and in some cases can result in the rigid culvert base becoming 'perched' if the base is not set at the correct gradient and below the bed so natural substrates are eroded adjacent to the culvert. This can create a 'step' in channel, which creates continuity • The size of the channel suggests there is unlikely to be major diversity in river depth and width, but there is still a significant risk to the water body.	N/A	• Flow depths and widths could be decreased, with a reduction in wetted areas	N/A	N/A	N/A	N/A	• Out of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may exert scour/ange in extreme events • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A	N/A	N/A	N/A	• Out of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may exert scour/ange in extreme events • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A	No impact to upstream water bodies				• Channel width appears to be consistent, as would be expected for a small watercourse. Channel does not seem to be over-wide • Channel depth cannot be assessed from available data, but given the size of the watercourse is likely to be consistent
15. Structure and substrate of river bed	-	-	-	N/A	N/A	• Lengthening a channel tends to reduce flow rates and increase deposition of sediment • Given the size of the watercourse there would probably be no measurable impact	N/A	N/A	N/A	• The size of the channel suggests there is unlikely to be major diversity in river depth and width, but there is still a significant risk to the water body bed structure	N/A	• Dewatering could result in increases in sedimentation in the reaches of the watercourse downstream of the springs due to elevated sediment loadings due to urbanisation • However, the headwaters are small channels, so there is unlikely to be much diversity in bed form, and impacts may not be significant	N/A	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant diversity of bed transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant diversity of bed transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	No impact to upstream water bodies				• Low, small, calcareous RBMP channel type • Developed on Gault formation and upper greensand formation Lowlfarmstead; mudstone siltstone and sandstone • No faults mapped at the site that would suggest an influence on channel form • Natural channel sediments are probably derived from the Gault formation and adjacent land use is arable agriculture. It is likely that the channel is dominated by sands and fine sediments
16. Structure of riparian zone	-	-	-	N/A	N/A	• The embankment would modify the riparian zone and reduce connectivity, but in wide body terms this is unlikely to be a severe problem	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel.	N/A	• Reduced flows could result in decreased flow depths and reduced channel - riparian connectivity, in the headwaters of the water body which are the reaches unaffected by residential development	N/A	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	No impact to upstream water bodies				• Continuous mature vegetation, but narrow because agriculture extends close to near bank tops • Good riparian continuity

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NONE	-	-	Predicted change in status (assuming 'green = none, amber = possible, red = likely)	N/A	N/A	N/A	N/A	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Cutting		Impacts from other WFD water bodies (assessed separately) - Multiple scheme elements - Stoke Brook Aylesbury (GB106039030320)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
	GB106039030350			Description of scheme element impact	Wendover Green Tunnel				Construction	Operation		
	Bear Brook, Hartwell Ditch, at west Aylesbury	Poor	Good Ecological Potential by 2027	Identified biological impacts	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	Poor	-		No significant changes in flow identified by the groundwater assessment.	No significant changes in water quality identified by the groundwater assessment.	No significant impacts on upstream water bodies that would affect Bear Brook following mitigation.	No impact on this element	None required.	None required.	No impact on this element	
	3. Macroinvertebrates	-	-		No significant changes in flow identified by the groundwater assessment.	No significant changes in water quality identified by the groundwater assessment.	No significant impacts on upstream water bodies that would affect Bear Brook following mitigation.	No impact on this element	None required.	None required.	No impact on this element	
	4. Fish	Moderate	Moderate by 2015 (Good status not required)		No significant changes in flow identified by the groundwater assessment.	No significant changes in water quality identified by the groundwater assessment.	No significant impacts on upstream water bodies that would affect Bear Brook following mitigation.	No impact on this element	None required.	None required.	No impact on this element	
	Physico-Chemical status											
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	• No significant effects identified from groundwater assessment	• No significant effects identified from groundwater assessment	No significant impacts on upstream water bodies that would affect Bear Brook following mitigation.	No impact on this element	None required.	None required.	N/A	-
	6. pH	High	-									
	7. Phosphate	Moderate	-									
	8. Ammonia	High	-									
	9. Temperature	-	-									
	10. Specific Pollutants (Annex VIII)	-	-									
	Hydromorphological status											**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	• No significant effects identified from groundwater assessment	• No significant effects identified from groundwater assessment	No significant impacts on upstream water bodies that would affect Bear Brook following mitigation.	No impact on this element	None required.	None required.	N/A	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-									
	13. River continuity	-	-									
	14. River depth and width variation bed	-	-									
	15. Structure and substrate of river bed	-	-									
	16. Structure of riparian zone	-	-									

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen								
Appropriate techniques to align and attenuate flow to limit detrimental effects of these features (drainage)	In place	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	No likely impact.	N/A	N/A	N/A	N/A
Appropriate channel maintenance strategies and techniques - woody debris	In place	-		N/A	N/A	N/A	No likely impact.	N/A	N/A	N/A	N/A
Appropriate channel maintenance strategies and techniques - minimise disturbance to channel bed and margins	In place	-		N/A	N/A	N/A	No likely impact.	N/A	N/A	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current Status	Status objective	Scheme Elements	Viaduct (clear span)					Viaduct (Footings in watercourse)					Impacts from other WFD water bodies (assessed separately) - Multiple Scheme elements - Fleet Marston Brook	OVERALL impact on element	Proposed Mitigation Measures		Residual impact	-
	GB106039030370			Description of scheme element impact	Thame valley viaduct (14 m wide, 4.5 to 6 m high) - River Thame - Code CFA11-SWC13 (64+940). Clear span. No diversion or footings in watercourse. Footings will be located close to banks edge (no further information)					Thame valley viaduct (14 m wide, 4.5 to 6 m high) - Pier in pond feeding tributary of River Thame - Code CFA11-SWC12 (64+500) , Believed to be a SuDS feature. It is not likely to have any significant flow of its own at any time.							Construction	Operation		
	Thame (Aylesbury to Scotsgrove Brook)	Poor	Good Ecological Potential by 2027	Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	Moderate	Good by 2027	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	-	-		Receptor not sensitive to impact. No likely effect anticipated.	No footings in watercourse.	Likely to lead to localised but permanent loss of macrophytes, due to reduction of photosynthetic activity. The watercourse supports moderately diverse aquatic vegetation in localised areas (ecology baseline surveys). Only very localised adverse effect anticipated.	No hydromorphological effect expected. No likely effect.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality that would affect macrophytes.	Receptor not sensitive to impact.	Likely to lead to localised but permanent loss of habitat. No local macrophyte data available. By default, localised adverse effect anticipated.	Likely to lead to localised but permanent loss of macrophytes, due to reduction of photosynthetic activity. Very localised adverse effect anticipated.	No hydromorphological effect expected. No likely effect.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated effect on macrophytes.	Given the relatively small contribution from Fleet Marston Brook to the River Thame, hydromorphological changes that are likely to originate from the cumulative impacts of the scheme elements present on Fleet Marston Brook water body are unlikely to be significant for the River Thame. No likely effect anticipated.	The two scheme elements are identified as having potential adverse effects on macrophytes. However, these adverse effects are likely to be only very localised around the scheme elements. The River Thame does not have a WFD status for the macrophytes element.	None required.	None required.	Minor and localised effects	
	3. Macroinvertebrates	Good	Good		Receptor not sensitive to impact. No likely effect anticipated.	No footings in watercourse.	Likely to lead to localised but permanent reduction of habitat available to macroinvertebrates (due to local loss of aquatic vegetation). Any effect would be minor and very localised.	No hydromorphological effect expected. No likely effect.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality that would affect macroinvertebrates.	Receptor not sensitive to impact.	Likely to lead to localised but permanent loss of habitat. No local macroinvertebrates data available. By default, localised adverse effect anticipated, with no effect on the status of the element anticipated at the scale of the water body.	Likely to lead to localised but permanent reduction of habitat available to macroinvertebrates (aquatic vegetation). No local macroinvertebrates data available. By default, localised adverse effect anticipated, with no effect on the status of the element anticipated at the scale of the water body.	No hydromorphological effect expected. No likely effect.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated effect on macroinvertebrates.	Given the relatively small contribution from Fleet Marston Brook to the River Thame, hydromorphological changes that are likely to originate from the cumulative impacts of the scheme elements present on Fleet Marston Brook water body are unlikely to be significant for the River Thame. No likely effect anticipated.	The two scheme elements are identified as having potential adverse effects on macroinvertebrate, by potentially reducing habitat available in very localised areas. However, this is considered as being of very low risk and would only be highly localised with minor/negligible effects at the most. It would not lead to the deterioration of the WFD macroinvertebrate current status (Good) of the water body. In addition, the scheme is unlikely to compromise the achievement of the WFD objectives (which are for the status to remain Good).	None required.	None required.		
	4. Fish	Poor	Good		Localised and temporary effect during construction.	No footings in watercourse.	Likely to lead to localised but permanent reduction of habitat available to fish (aquatic vegetation, riparian vegetation). The watercourse supports fish population of moderate diversity and low abundances (ecology baseline surveys). Any effect would be minor and very localised.	No hydromorphological effect expected. No likely effect.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality that would affect fish.	Localised and temporary effect during construction. No deterioration of the water body status of the element is however expected.	Likely to lead to localised but permanent loss of habitat. No local fish data available. By default, localised adverse effect anticipated, with no effect on the status of the element anticipated at the scale of the water body.	Likely to lead to localised but permanent reduction of habitat available to fish (aquatic vegetation, riparian vegetation). No local fish data available. By default, localised adverse effect anticipated, with no effect on the status of the element anticipated at the scale of the water body.	No hydromorphological effect expected. No likely effect.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated effect on fish.	Given the relatively small contribution from Fleet Marston Brook to the River Thame, hydromorphological changes that are likely to originate from the cumulative impacts of the scheme elements present on Fleet Marston Brook water body are unlikely to be significant for the River Thame. However, the presence of several culverts on Fleet Marston Brook and its tributaries could possibly constitute an obstruction to fish passage and therefore reduce habitat available for fish, if they not designed as to allow fish passage. However, the baseline data suggests that the River Thame does not currently support any migratory species. Effects are unlikely, but this is flagged up as a minor 'yellow' risk for possible minor and localised effects, with no deterioration of the status of the element at the scale of the water body anticipated.	The two scheme elements are identified as having potential adverse effects on fish, by potentially reducing habitat available in very localised areas. However, this is very low risk and would only be highly localised with minor/negligible effects at the most. They would not lead to the deterioration of the WFD fish current status (Poor) of the water body. In addition, the scheme is unlikely to compromise the achievement of the WFD objectives (which are for the element status to be Good by 2027).	None required.	None required.		
	Physico-Chemical status																			
WFD classification elements	5. Dissolved Oxygen	Good	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	Minor and localised effects	-
	6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact						
	7. Phosphate	Poor	-		N/A	N/A	N/A	ively an open span bridge, so there would be	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	N/A	N/A	vely an open span bridge, so there would b	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.						
	8. Ammonia	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact						
	9. Temperature	-	-		N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact						
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.						
	Hydromorphological status																			**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• Crossing is effectively an open span bridge. Civil Parish boundary (which has presumably been established for decades) follows channel centreline at the crossing location and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	N/A	N/A	N/A	• Crossing is effectively an open span bridge. A pier in pond feeding tributary of River Thame would cause direct loss of the pond habitat, which will presumably be relocated. There would no hydromorphological impact on watercourses.	N/A	N/A	• The open span crossing would have no impact on hydromorphology	None required.	None required.	No significant impacts	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A		N/A	N/A	N/A	N/A		N/A	N/A					
	13. River continuity	-	-		N/A	N/A	N/A		N/A	N/A	N/A	N/A		N/A	N/A					
	14. River depth and width variation bed	-	-		N/A	N/A	N/A		N/A	N/A	N/A	N/A		N/A	N/A					
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A		N/A	N/A	N/A	N/A		N/A	N/A					
	16. Structure of riparian zone	-	-		N/A	N/A	N/A		N/A	N/A	N/A	N/A		N/A	N/A					

B. Risk screening of potential to prevent future attainment of good WFD status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen																		
NONE	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	River Diversion			Culvert					River Diversion			Culverts				
	GB106039030420	Poor	Good Ecological Status by 2027	Description of scheme element impact	Quainton South Embankment - 100 m - Fleet Marston Brook - 70+700 - Code CFA12-SWC1			Quainton South Embankment - 2 x culvert (73 m and 60 m) - Fleet Marston Brook - 70+700 - Code CFA12-SWC1					Tributaries of Fleet Marston Brook: Bicester Road Embankment (66+800 to 66+880) - realignment and connection to watercourse at 68+880, Bicester Road Embankment (66+220) - reprofiling, Bicester Road Embankment (67+300 approximately) - extension			Tributaries of Fleet Marston Brook: Bicester Road Embankment culvert - 80 m (66+890); Access road (15 m) - CFA11-SWC35; Access road (13 m) - Code CFA11-SWC36; Stockpile (55 m) - Code CFA11-SWC37				
	Fleet Marston Brook, Denham Brook, Pitchcott Brook west			Identified biological impacts	Landtake	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Creation of new habitats	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Creation of new habitats	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	-	-		Temporary loss of approximately 100 m of habitats of the existing Fleet Marston Brook that lies within the diverted section while the new channels re-establish. It is anticipated that the macrophyte community will re-establish within 1 to 2 years of completion of the river diversion. The watercourse is currently heavily shaded and supports very little aquatic vegetation in the stretch impacted (baseline ecology surveys). Minor, localised adverse effect anticipated.	Potential decrease in flow rates and locally reduced habitat continuity. The watercourse is heavily shaded by riparian vegetation in the stretch impacted and currently supports very low aquatic vegetation (ecology baseline surveys). Effects on macrophytes likely to be negligible.	The new channels will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. The watercourse is heavily shaded by riparian vegetation in the stretch impacted and currently supports very low aquatic vegetation (ecology baseline surveys). The effect on this quality element is considered to be minor beneficial and localised.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to a localised but permanent loss of habitat. The watercourse is heavily shaded by riparian vegetation in the stretch impacted and currently supports very low aquatic vegetation (ecology baseline surveys). Effects on macrophytes likely to be negligible.	Likely to lead to localised but permanent loss of macrophytes, due to reduction of photosynthetic activity. The watercourse is heavily shaded by riparian vegetation in the stretch impacted and currently supports very low aquatic vegetation (ecology baseline surveys). Effects on macrophytes likely to be negligible.	Potential increase in flow velocities with homogenised flow patterns and reduction of habitat continuity. The watercourse is heavily shaded by riparian vegetation in the stretch impacted and currently supports very low aquatic vegetation (ecology baseline surveys). Effects on macrophytes likely to be negligible.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Temporary loss of habitats of the existing tributaries of Fleet Marston Brook (drains) that lies within the diverted section while the new channels re-establish. It is anticipated that the macrophyte community will re-establish within 1 to 2 years of completion of the river diversion. No macrophyte data available for any of the tributaries. By default, temporary adverse effect with no change in the status of the element at the scale of the water body.	No significant changes anticipated. No likely effect on this quality element.	The new channels will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. No baseline data available for any of the tributaries. The effect on this quality element is considered to be minor beneficial and localised.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to the permanent loss of approximately 150 m of habitat. No macrophyte data available for any of the tributaries. By default, adverse effect with no change in the status of the element at the scale of the water body.	Likely to lead to the permanent loss of macrophytes, due to reduction in photosynthetic activity. No macrophyte data available for any of the tributaries. By default, adverse effect with no change in the status of the element at the scale of the water body.	Potential increase in flows velocities with homogenised flow patterns, reduction of habitat continuity, with no effect at the scale of the water body. No macrophyte data available for any of the tributaries. By default, adverse effect with no change in the status of the element at the scale of the water body.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.
	3. Macroinvertebrates	Moderate	Good by 2027		Temporary loss of approximately 100 m of habitats of the existing Fleet Marston Brook that lies within the diverted section while the new channels re-establish. The watercourse currently supports moderately good macroinvertebrate quality, and communities adapted to relatively slow flowing conditions and heavy sedimentation (ecology baseline surveys). Effects on macroinvertebrates likely to be locally adverse. Minor, localised adverse effect anticipated.	Potential decrease in flow rates, locally reduced habitat continuity and local disconnection between channel and riparian vegetation. The watercourse currently supports moderately good macroinvertebrate quality, and communities adapted to relatively slow flowing conditions and heavy sedimentation (ecology baseline surveys). Effects on macroinvertebrates likely to be locally adverse. Minor, localised adverse effect anticipated.	The river diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach . The watercourse currently supports moderately good macroinvertebrate quality, and communities adapted to relatively slow flowing conditions and heavy sedimentation (ecology baseline surveys). Effects on macroinvertebrates likely to be locally adverse. Minor, localised adverse effect anticipated.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to a localised but permanent loss of habitat available to macroinvertebrates (i.e. streambed, riparian vegetation). The watercourse currently supports moderately good macroinvertebrate quality (ecology baseline surveys). Effect likely to be minor and highly localised.	No additional effect anticipated (loss of habitat already considered in the landtake impact).	Potential increase in flow velocities with homogenised flow patterns, reduction of habitat continuity and local disconnection between channel and riparian vegetation, with no effect at the scale of the water body. No macroinvertebrate data available for any of the tributaries. By default, temporary adverse effect with no change in the status of the element at the scale of the water body.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Temporary loss of habitats of the existing Fleet Marston Brook that lies within the diverted section while the new channels re-establish. No baseline data available for any of the tributaries. By default, temporary adverse effect with no change in the status of the element at the scale of the water body.	No significant changes anticipated. No likely effect on this quality element.	The river diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach. No baseline data available for any of the tributaries. Locally beneficial effect anticipated, with no degradation of the status of this element expected at the water body scale.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to the permanent loss of approximately 150 m of habitat. No macroinvertebrate data available for any of the tributaries. By default, adverse effect with no change in the status of the element at the scale of the water body.	No additional effect anticipated (loss of habitat already considered in the landtake impact).	Potential increase in flows velocities with homogenised flow patterns, reduction of habitat continuity and reduced connectivity with riparian vegetation, with no effect at the scale of the water body. No macroinvertebrate data available for any of the tributaries. By default, adverse effect with no change in the status of the element at the scale of the water body.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.
	4. Fish	Poor	Good by 2027		Temporary loss of approximately 100 m of habitats of the existing Fleet Marston Brook that lies within the diverted section while the new channels re-establish. No fish data available locally but low fish diversity and abundances downstream (baseline ecology surveys). Fish kill expected while dewatering existing channel. Minor, localised adverse effect anticipated.	Potential decrease in flow rates, locally reduced habitat continuity and local disconnection between channel and riparian vegetation. No data available on fish for Fleet Marston Brook on the area impacted, but near to the confluence with the River Thame (downstream), fish abundances and diversity are poor (baseline ecology surveys). Minor, localised adverse effect anticipated.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities. No data available on fish for Fleet Marston Brook on the area impacted, but near to the confluence with the River Thame (downstream), fish abundances and diversity are poor (baseline ecology surveys). New channels likely to provide, when re-established, similar habitats for fish. Locally beneficial effect anticipated.	No data available on fish for Fleet Marston Brook in the area impacted but low fish diversity and abundances downstream (baseline ecology surveys).. By default, localised and temporary adverse effect during construction.	Likely to lead to a localised but permanent loss of habitat, and constitute an obstruction to fish movements. No data available on fish for Fleet Marston Brook on the area impacted, but near to the confluence with the River Thame (downstream), fish abundances and diversity are poor (baseline ecology surveys). Not a fisheries designated water body. Localised adverse effect.	No additional effect anticipated (loss of habitat already considered in the landtake impact).	Potential increase in flow velocities with homogenised flow patterns. No data available on fish for Fleet Marston Brook on the area impacted, but near to the confluence with the River Thame (downstream), fish abundances and diversity are poor (baseline ecology surveys). Not a fisheries designated water body. By default, localised adverse effect.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Temporary loss of habitats of the existing Fleet Marston Brook that lies within the diverted section while the new channels re-establish. No baseline data available for any of the tributaries. Fish kill expected while dewatering existing channel. By default, temporary adverse effect with no change in the status of the element at the scale of the water body.	No significant changes anticipated. No likely effect on this quality element.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities. No baseline data available for any of the tributaries. Locally beneficial effect anticipated, with no degradation of the status of this element expected at the water body scale.	No data available on fish for any of the tributaries. By default, localised and temporary adverse effect during construction.	Likely to lead to a localised but permanent loss of 150 m of habitat, and constitute obstructions to fish movements. No data available on fish for any of the tributaries, Fleet Marston Brook known to support low fish quality and is not a fisheries designated water body (baseline ecology surveys). By default, adverse effect with no deterioration of the status of the element at the scale of the water body.	No additional effect anticipated (loss of habitat already considered in the landtake impact).	Potential increase in flows velocities with homogenised flow patterns, reduction of habitat continuity and reduced connectivity with riparian vegetation, with no effect at the scale of the water body. No data available on fish for any of the tributaries. Fleet Marston Brook known to support low fish quality and is not a fisheries designated water body. (baseline ecology surveys). By default, adverse effect with no deterioration of the status of the element at the scale of the water body.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.
	Physico-Chemical status																			
WFD classification elements	5. Dissolved Oxygen	Good	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body.	N/A	N/A	Due to the length of the proposed culverts, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body.	N/A	N/A	Due to the length of the proposed culverts, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
	6. pH	High	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	7. Phosphate	Bad	-		N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact
	8. Ammonia	Good	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	9. Temperature	-	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the proposed culverts, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the proposed culverts, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact
	10. Specific Pollutants (Annex VIII)	-	-		N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
	Hydromorphological status																			
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	• Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics, or sufficient stream power for channel sustainability to be affected. • Lengthening the channel may reduce flow rates although the diversion minor and is not far from the existing channel course. • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable	• The extent of new watercourse that would be created, and the possible negative effects of altering existing channel conditions, mean that there would be no significant habitat creation	N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness.	N/A	N/A	• Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics, or sufficient stream power for channel sustainability to be affected. • Lengthening the channel may reduce flow rates although the diversion minor and is not far from the existing channel course • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable	• The extent of new watercourse that would be created, and the possible negative effects of altering existing channel conditions, mean that there would be no significant habitat creation	N/A	N/A	N/A	• The tributaries are effectively field drains and size of the channels means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness.	N/A
	12. Connection to Groundwater	-	-		N/A	• Likely to be no significant relationship between hydromorphology and groundwater		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A
	13. River continuity	-	-		N/A	• Minor lengthening of the channel would probably not have any significant effect, but the embankment would reduce riparian and floodplain connectivity		N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, the extents of culverts suggest there would not be a severe impact on deterioration of the overall water body status	N/A	N/A	• Minor lengthening of the channel would probably not have any significant effect, but the embankment would reduce riparian and floodplain connectivity		N/A	N/A	N/A	• The culverts would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in water body terms, these are minor features and the culvert would not impact on deterioration of the overall water body status	N/A
	14. River depth and width variation bed	-	-		N/A	• The diversion would replicate existing channel geometry. Out of channel flow depths may decrease as a result of lengthening the channel, but in practical terms there would be no significant change		N/A	N/A	N/A	• Out-of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events	N/A	N/A	• The diversion would replicate existing channel geometry. Out of channel flow depths may decrease as a result of lengthening the channel, but in practical terms there would be no significant change		N/A	N/A	N/A	• Out-of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The size of the channels suggests there would not be significant loss of diversity in river depth and width	N/A
	15. Structure and substrate of river bed	-	-		N/A	• Lengthening a channel tends to reduce flow rates and increase deposition of sediment • Given the size of the watercourse there would probably be no measurable impact		N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	N/A	• Lengthening a channel tends to reduce flow rates and increase deposition of sediment • Given the size of the watercourse there would probably be no measurable impact		N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A
	16. Structure of riparian zone	-	-		N/A	• Riparian zones would be altered as part of the construction of embankments, and hydraulic connectivity to these areas may decrease		N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	N/A	• Riparian zones would be altered as part of the construction of embankments, and hydraulic connectivity to these areas may decrease		N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen																	
NONE	-	-	Predicted change to status states (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Culvert					River Diversion			Cutting	
	GB106039030420	Poor	Good Ecological Status by 2027	Description of scheme element impact	Tributary of Fleet Marston Brook: Thame Valley North Embankment/Viaduct culvert - 20 m - Code CFA11-SWC14 (65+050)					Tributaries of Fleet Marston Brook: Thame Valley North Embankment/Viaduct - diversion and reconnection to drain at 65+050 (420 m)			Fleet Marston Brook and Tributaries : Thame Valley Viaduct North cutting, Thame Valley Viaduct North cutting	
	Fleet Marston Brook, Denham Brook, Pitchcott Brook west			Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Creation of new habitats	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	-	-		Receptor not sensitive to impact	Likely to lead to the permanent loss of approximately 20 m of habitat. No macrophyte data available for any of the tributaries. By default, very localised adverse effect with no change in the status of the element at the scale of the water body.	Likely to lead to the permanent loss of macrophytes, due to the reduction of photosynthetic activity. No macrophyte data available for any of the tributaries. By default, very localised adverse effect with no change in the status of the element at the scale of the water body.	Potential increase in flows velocities with homogenised flow patterns, reduction of habitat continuity, with no effect at the scale of the water body. No macrophyte data available for any of the tributaries. By default, adverse effect with no change in the status of the element at the scale of the water body.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Temporary loss of approximately 420 m of habitats of the existing tributaries (field drains) of Fleet Marston Brook that lie within the diverted section while the new channels re-establish. It is anticipated that the macrophyte community will re-establish within 1 to 2 years of completion of the river diversion. No macrophyte data available for any of the tributaries. Localised and temporary adverse effect expected.	No significant changes anticipated. No likely effect on this quality element.	The new channels will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. No macrophyte data available for any of the tributaries. The effect on this quality element is considered to be minor beneficial and localised.	No significant effect on flows anticipated. No likely effect on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.
	3. Macroinvertebrates	Moderate	Good by 2027		Receptor not sensitive to impact	Likely to lead to the permanent loss of approximately 20 m of habitat. No macroinvertebrate data available for any of the tributaries. By default, very localised adverse effect with no change in the status of the element at the scale of the water body.	No additional effect anticipated (loss of habitat already considered in the landtake impact).	Potential increase in flows velocities with homogenised flow patterns, reduction of habitat continuity and reduced connectivity with riparian vegetation, with no effect at the scale of the water body. No macroinvertebrate data available for any of the tributaries. By default, adverse effect with no change in the status of the element at the scale of the water body.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Temporary loss of approximately 420 m of habitats of the existing tributaries (field drains) of Fleet Marston Brook that lie within the diverted section while the new channels re-establish. No baseline data available. Localised and temporary adverse effect expected.	No significant changes anticipated. No likely effect on this quality element.	The river diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach. No baseline data available. Locally beneficial effect anticipated.	No significant effect on flows anticipated. No likely effect on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.
	4. Fish	Poor	Good by 2027		No data available on fish for any of the tributaries. By default, localised and temporary adverse effect during construction.	Likely to lead to a localised but permanent loss of 20 m of habitat, and constitute obstructions to fish movements. No data available on fish for the tributary. Fleet Marston Brook known to support low fish quality and is not a fisheries designated water body (baseline ecology survey). By default, adverse effect with no deterioration of the status of the element at the scale of the water body.	No additional effect anticipated (loss of habitat already considered in the landtake impact).	Potential increase in flows velocities with homogenised flow patterns, reduction of habitat continuity and reduced connectivity with riparian vegetation, with no effect at the scale of the water body. No data available on fish for any of the tributaries. Fleet Marston Brook known to support low fish quality and is not a fisheries designated water body (baseline ecology survey). By default, adverse effect with no deterioration of the status of the element at the scale of the water body.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Temporary loss of approximately 420 m of habitats of the existing tributaries (field drains) of Fleet Marston Brook that lie within the diverted section while the new channels re-establish. No baseline data available. Fish kit expected while dewatering existing channel. Localised and temporary adverse effect expected.	No significant changes anticipated. No likely effect on this quality element.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities. No baseline data available. New channels likely to provide, when re-established, similar habitats for fish. Locally beneficial effect anticipated.	No significant effect on flows anticipated. No likely effect on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.
	Physico-Chemical status													
WFD classification elements	5. Dissolved Oxygen	Good	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	Due to the length of the proposed culverts, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body.	No significant effect on flows anticipated. No likely effect on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.
	6. pH	High	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No significant effect on flows anticipated. No likely effect on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.
	7. Phosphate	Bad	-		N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/tamporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	No significant effect on flows anticipated. No likely effect on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.
	8. Ammonia	Good	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No significant effect on flows anticipated. No likely effect on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.
	9. Temperature	-	-		N/A	N/A	Due to the length of the proposed culverts, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No significant effect on flows anticipated. No likely effect on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.
	10. Specific Pollutants (Annex VIII)	-	-		N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	No significant effect on flows anticipated. No likely effect on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.
	Hydromorphological status													
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• The tributaries are effectively field drains and size of the channels means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness.	N/A	N/A	• Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics, or sufficient stream power for channel sustainability to be affected • Lengthening the channel may reduce flow rates although the diversion minor and is not far from the existing channel course • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable	• The extent of new watercourse that would be created, and the possible negative effects of altering existing channel conditions, mean that there would be no significant habitat creation	No significant effect on flows anticipated. No likely effect on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater		No significant effect on flows anticipated. No likely effect on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.
	13. River continuity	-	-		N/A	N/A	N/A	• The culverts would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in water body terms, these are minor features and the culvert would not impact on deterioration of the overall water body status	N/A	N/A	• Minor lengthening of the channel would probably not have any significant effect, but the embankment would reduce riparian and floodplain connectivity		No significant effect on flows anticipated. No likely effect on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.
	14. River depth and width variation bed	-	-		N/A	N/A	N/A	• Out-of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The size of the channels suggests there would not be significant loss of diversity in river depth and width	N/A	N/A	• The diversion would replicate existing channel geometry. Out of channel flow depths may decrease as a result of lengthening the channel, but in practical terms there would be no significant change		No significant effect on flows anticipated. No likely effect on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	N/A	• Lengthening a channel tends to reduce flow rates and increase deposition of sediment • Given the size of the watercourse there would probably be no measurable impact		No significant effect on flows anticipated. No likely effect on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	N/A	• Riparian zones would be altered as part of the construction of embankments, and hydraulic connectivity to these areas may decrease		No significant effect on flows anticipated. No likely effect on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	Predicted change to status elements (green = none, amber = possibly, red = likely)										
NONE	-	-		-	-	-	-	-	-	-	-	-	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Impacts from other WFD water bodies (assessed separately)	OVERALL impact on element	Proposed Mitigation Measures		Residual impact	
							Construction	Operation		
	GB106039030420	Poor	Good Ecological Status by 2027	Description of scheme element impact						
	Fleet Marston Brook, Denham Brook, Pitchcott Brook west			Identified biological impacts						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	
	2. Macrophytes and phytobenthos - macrophytes	-	-		No scheme element on upstream water body	The effects of two scheme elements present on Fleet Marston Brook are likely to be localised (culverts) and / or temporary (river diversion). However, the several culverts (170 m in total) and river diversions (420 m in total) present on the tributaries (drain ditches) of Fleet Marston Brook are also likely to have localised and / or temporary adverse effects on this quality element. Adverse effects from the river diversions would however be balanced by the creation of new habitats. In the absence of baseline data for the tributaries impacted, a potential adverse effect is anticipated locally. Given the low contribution of the tributaries to Fleet Marston Brook, no effect anticipated at the scale of the water body.	No additional mitigation required	No additional mitigation required	This quality element does not currently have a WFD status. No effect anticipated at the scale of the water body.	
	3. Macroinvertebrates	Moderate	Good by 2027		No scheme element on upstream water body	The effects of two scheme elements present on Fleet Marston Brook are likely to lead to very localised (culvert) or temporary (river diversion) adverse effects that would be balanced by the creation of new habitats. In addition, the several culverts (170 m in total) and river diversions (420 m) present on the tributaries (drain ditches) of Fleet Marston Brook are also likely to have localised and / or temporary adverse effects on macroinvertebrates. In the absence of baseline data for any of the tributaries impacted, cumulative effects from the culverts will be considered as having the potential to have an adverse effect at the water body level. However, given the low contribution of the tributaries to Fleet Marston Brook, no deterioration of the current WOF status (Moderate) of this scheme element is anticipated.	No additional mitigation required	No additional mitigation required	The scheme is considered to have no potential to deteriorate the current WOF status (Moderate) of this scheme element.	
	4. Fish	Poor	Good by 2027		No scheme element on upstream water body	The effects of two scheme elements present on Fleet Marston Brook are likely to lead to very localised (culvert) or temporary (river diversion) adverse effects that would be balanced by the creation of new habitats. In addition, the several culverts (170 m in total) and river diversions (420 m) present on the tributaries (drain ditches) of Fleet Marston Brook are also likely to have localised and / or temporary adverse effects on fish. However, culverts could also constitute obstruction to fish movements and limit access to potential habitats (spawning) of value to fish on the tributaries. Fleet Marston Brook is not designated under the Freshwater Fish Directive and baseline data did not demonstrate the presence of any migratory fish species. Therefore, despite the absence of information on the value for fish of the tributaries impacted, the scheme will not be considered as having the potential to deteriorate the current WFD status (Poor) of this quality element.	No additional mitigation required	No additional mitigation required	The scheme is not be considered as having the potential to deteriorate the current WFD status (Poor) of this quality element.	
	Physico-Chemical status									
WFD classification elements	5. Dissolved Oxygen	Good	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	No scheme element on upstream water body	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are considered temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	No additional mitigation required	No additional mitigation required	No significant effects predicts	
	6. pH	High	-		No scheme element on upstream water body					
	7. Phosphate	Bad	-		No scheme element on upstream water body					
	8. Ammonia	Good	-		No scheme element on upstream water body					
	9. Temperature	-	-		No scheme element on upstream water body					
	10. Specific Pollutants (Annex VIII)	-	-		No scheme element on upstream water body					
	Hydromorphological status									**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	No scheme element on upstream water body	• The diversion is unlikely to have any significant effects • The large number of culverts relative to a small water body, albeit on field drains where for each individual case hydromorphology would not be severely effected, could have a cumulatively detrimental effect on hydromorphology • This is actually considered unlikely, since the culverts are generally on field drains, but the adverse effects must be flagged as a risk	Undertake hydromorphological surveys to aid detailed design Incorporate hydromorphological measures into detailed design where practicable. Mitigation measures may include: • Create low flow channels in over-widened/over-deepened channels • Create reed fringes • Introduce riparian vegetation/green corridors where space allows • Recreate a sinuous river channel (re-meandering) where space allows • Retain marginal vegetation • Use of engineering techniques to assist natural recovery • Use soft engineering techniques	Potential adverse effects	• Hydromorphological baseline data is derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		No scheme element on upstream water body					
	13. River continuity	-	-		No scheme element on upstream water body					
	14. River depth and width variation bed	-	-		No scheme element on upstream water body					
	15. Structure and substrate of river bed	-	-		No scheme element on upstream water body					
	16. Structure of riparian zone	-	-		No scheme element on upstream water body					

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen					
NONE	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	River Diversion			Culvert beneath Quainton South Embankment					Culvert beneath Doddershall Embankment				
	GB106039030070	Bad	Good by 2027	Description of scheme element impact	Unnamed tributary of Tetchwick Brook - SWC-CFA12-3 (71+710) - 95 m, and SWC-CFA12-15, SWC-CFA12-16, SWC-CFA12-17 (short diversions at Station Road)			Unnamed tributaries of Tetchwick Brook: SWC-CFA12-2 (71+650) - 61 m and 24 m culverts, SWC-CFA12-15 - 12 m culvert, SWC-CFA12-16 - 15 m culvert, SWC-CFA12-17 - 18 m culvert					Unnamed tributaries of Doddershall Brook: SWC-CFA12-5 (73+190) - 61 m culvert and 13 m culvert, SWC-CFA12-6 (73+430) - 67 m culvert, SWC-CFA12-7 (73+490) - 5 m culvert and 68 m culvert, SWC-CFA12-8 (73+650) - 5 m culvert, 17 m culvert and 46 m culvert, SWC-CFA12-19 (72+500), 50 m culvert extension				
	Tetchwick Brook, Source to Ray and tributaries			Identified biological impacts	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	n/a	n/a		There will be loss of marginal and channel macrophytes over the 95 m length of the existing tributaries of Tetchwick Brook that lies within the diverted section. No baseline data available for the tributaries (drainage ditches). Given the small importance of the tributaries at the scale of the water body, only localised adverse effect anticipated.	The new channels will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. No baseline data available for the tributary. Potential beneficial effect anticipated.	Potential localised reduction in flow rates with no significant effects to the Tetchwick Brook itself. As no data is available for these minor tributaries of Tetchwick Brook, potential localised adverse effect anticipated.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to the loss of a total of approximately 130 m of macrophyte habitat on the tributaries of Tetchwick Brook (drainage ditches). No baseline data available for any of the tributaries. By default, localised adverse effect anticipated on the tributaries.	Likely to lead to the loss of macrophytes on a total of approximately 130 m by reduction of photosynthetic activity. No baseline data available for any of the tributaries. By default, localised adverse effect anticipated on the tributaries	Potential homogenised flow patterns and increase in flow velocities locally, with no significant effect at the scale of the water body. In the absence of baseline data for any of the tributaries, localised adverse effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to the loss of a total of approximately 300 m of macrophyte habitat on the minor tributaries of Doddershall Brook (drainage ditches). No baseline data available for any of the tributaries. Localised adverse effect anticipated on the tributaries.	Likely to lead to the loss of macrophytes over 300 m on the minor tributaries of Doddershall Brook (drainage ditches) by reduction of photosynthetic activity. No baseline data available for any of the tributaries. Localised adverse effect anticipated on the tributaries.	Potential homogenised flow patterns and increase in flow velocities locally. In the absence of baseline data for any of the tributaries (drainage ditches), localised adverse effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.
	3. Macroinvertebrates	Bad	Good by 2027		Temporary loss of 95 m macroinvertebrate of habitat on the tributaries while the new channels re-establish. No baseline data available for the tributaries (drainage ditches), Given the small importance of the tributaries at the scale of the water body, only localised adverse effect anticipated.	The river diversion will be designed to include appropriate habitats for colonisation by macroinvertebrate taxa that currently characterise the ditch habitat. No baseline data available for the tributary. Potential beneficial effect anticipated.	Potential localised reduction in flow rates with no significant effect at the scale of the Tetchwick Brook itself. As no data is available for these minor tributaries of Tetchwick Brook, potential localised adverse effect anticipated.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to the loss of a total of approximately 130 m of macroinvertebrate habitat (i.e. streambed, aquatic vegetation, riparian vegetation) on the tributaries of Tetchwick Brook (drainage ditches). No baseline data available for any of the tributaries. By default, adverse effect anticipated on the tributaries. Given the small importance of the tributaries at the scale of the water body, no degradation of the element status anticipated.	No additional effect anticipated (loss of vegetation already considered in the landtake impact), locally or at the scale of the water body.	Potential homogenised flow patterns and increase in flow velocities locally, with no significant effect at the scale of the water body. In the absence of baseline data for any of the tributaries, localised adverse effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to the loss of a total of 300 m of macroinvertebrate habitat (i.e. streambed, aquatic vegetation, riparian vegetation) on the minor tributaries of Doddershall Brook (drainage ditches). No baseline data available for any of the tributaries. Localised adverse effect anticipated on the tributaries.	No additional effect anticipated (loss of vegetation already considered in the landtake impact), locally or at the scale of the water body.	Potential homogenised flow patterns and increase in flow velocities locally. In the absence of baseline data for any of the tributaries (drainage ditches), localised adverse effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.
	4. Fish	n/a	n/a		Temporary loss of 95 m of habitat on the tributaries while the new channels re-establish. No fish data available locally on the tributaries (drainage ditches). Given the small importance of the tributaries at the scale of the water body, and as Tetchwick Brook is not a designated fisheries, only localised adverse effect anticipated.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities. No fish data available locally for the tributary. Potential beneficial effect anticipated.	Potential localised reduction in flow rates with no significant effect at the scale of the Tetchwick Brook. Given the small importance of the tributaries at the scale of the water body, and as Tetchwick Brook is not a designated fisheries, only localised adverse effect anticipated.	Localised and temporary effect during construction. No deterioration of the water body status of the element is however expected.	Reprofiling and channel straightening are likely to lead to the loss of a total of approximately 130 m of fish habitat (i.e. substrate, riparian vegetation) on the tributaries of Tetchwick Brook. Culverts would also constitute a barrier to fish movements. No baseline data available for any of the tributaries. Tetchwick Brook is not a Freshwater Fish Directive designated water body. By default, localised adverse effect anticipated on the tributaries.	No additional effect anticipated (loss of vegetation already considered in the landtake impact), locally or at the scale of the water body.	Potential homogenised flow patterns and increase in flow velocities locally, with no significant effect at the scale of the water body. In the absence of baseline data for any of the tributaries, and as Tetchwick Brook is not a designated fisheries, only localised adverse effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Localised and temporary effect during construction. No deterioration of the water body status of the element is however expected.	Reprofiling and channel straightening are likely to lead to the loss of a total of 300 m of fish habitat (i.e. substrate, riparian vegetation) on the minor tributaries of Doddershall Brook. Culverts would be designed to avoid being a barrier to fish movements. No baseline data available for any of the tributaries. Tetchwick Brook is not a Freshwater Fish Directive designated water body, and therefore minor tributary ditches are unlikely to represent important spawning habitat. Localised adverse effect anticipated on the tributaries.	No additional effect anticipated (loss of vegetation already considered in the landtake impact), locally or at the scale of the water body.	Potential homogenised flow patterns and increase in flow velocities locally. In the absence of baseline data for any of the tributaries (drainage ditches), and as Tetchwick Brook is not a designated fisheries, only localised adverse effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.
	Physico-Chemical status																
WFD classification elements	5. Dissolved Oxygen	Moderate	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body.	N/A	N/A	Due to the length of the proposed culverts, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Due to the length of the proposed culverts, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
	6. pH	High	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	7. Phosphate	Bad	-		N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact
	8. Ammonia	Good	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	9. Temperature	-	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the proposed culverts, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the proposed culverts, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact
	10. Specific Pollutants (Annex VIII)	-	-		N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
	Hydromorphological status																
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics • Unnamed tributary of Tetchwick Brook is a minor tributary of Tetchwick Brook, and in practical terms represents a small proportion of the water body • It is unclear whether proposed realignment would shorten the local channel reach or extend, although it appears that the diversion is an extension of the watercourse via a culvert at an embankment. • Lengthening the channel may reduce flow rates although the diversion is not far from the existing channel course. • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of lengthening the watercourse still needs to be flagged as a risk	N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • The unnamed tributaries to Doddershall Brook are effectively drainage ditches within the water body, and in practical terms the culverts would impact a small proportion of the water body	N/A	N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • The unnamed tributaries to Doddershall Brook are effectively drainage ditches within the water body, and in practical terms the culverts would impact a small proportion of the water body	N/A
	12. Connection to Groundwater	-	-		N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A
	13. River continuity	-	-		N/A	N/A	• Lengthening the channel may result in increased channel storage and reduced floodplain connectivity, but the size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected • The size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected	N/A	N/A	N/A	• The culverts on unnamed tributaries of Tetchwick Brook would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel, • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A	N/A	N/A	N/A	• The culverts on unnamed tributaries of Tetchwick Brook would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel, • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A
	14. River depth and width variation bed	-	-		N/A	N/A	• The diversion would replicate existing channel geometry. Out of channel flow depths may decrease as a result of lengthening the channel, but in practical terms there would be no significant change	N/A	N/A	N/A	• Out of bank flows would be severed by the culverts, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A	N/A	N/A	N/A	• Out of bank flows would be severed by the culverts, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A
	15. Structure and substrate of river bed	-	-		N/A	N/A	• Lengthening a channel tends to reduce flow rates and increase deposition of sediment • Given the size of the watercourse there would probably be no measurable impact	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A
	16. Structure of riparian zone	-	-		N/A	N/A	• Although channel capacity would increase, there is likely to be no net change to existing bank, riparian and floodplain structure and connectivity with channel	N/A	N/A	N/A	• The culverts would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	N/A	N/A	N/A	• The culverts would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen														
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NONE	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	River Diversion			Cutting		Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	-
	GB106039030070	Bad	Good by 2027	Description of scheme element impact	Unnamed tributaries of Doddershall Brook - SWC-CFA12-6 (73+430) - 67 m ?, and SWC-CFA12-7 (73+490) - 68 m ?			Quainton cutting - Approximately 72+000				Construction	Operation		
	Tetchwick Brook, Source to Ray and tributaries			Identified biological impacts	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	n/a	n/a		There will be loss of marginal and channel macrophytes over the 140 m length of the existing tributaries of Doddershall Brook that lie within the diverted section. No baseline data available for any of the tributaries (drainage ditches). By default, adverse effect anticipated on the tributaries.	The new channels will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. No baseline data available for any of the tributaries. Potential beneficial effect anticipated.	No measurable effect on flow rates or dynamics anticipated from hydromorphological assessment unless watercourse is lengthened. This information will not be available until the detailed design stage. Any effects on macrophytes for the minor tributaries of Doddershall Brook are considered to be negligible.	No likely impacts from reduction of groundwater levels by dewatering to contribution to surface water body as cutting is on unproductive strata	No likely impacts from reduction of groundwater levels by dewatering to contribution to surface water body as cutting is on unproductive strata	No scheme elements on upstream water body	Scheme elements present on this water body are only located only on minor tributaries (drainage ditches) of Tetchwick Brook and of one of its tributaries, Doddershall Brook. River diversions are considered as having the potential for temporary adverse effects on the tributaries but would be balanced by the creation of new habitats within the diverted channels. The numerous culverts are identified as having an adverse effect locally on the tributaries but although there will be 400 m of culverts in total -they will be designed to ensure there is no change in flow regime downstream that could affect Tetchwick Brook. Furthermore, the tributaries (drainage ditches) have a relatively low contribution to the whole water body. No deterioration of this quality element is anticipated.	None required.	None required.	Minor and localised effects	
	3. Macroinvertebrates	Bad	Good by 2027		Temporary loss of 140 m macroinvertebrate of habitat on the tributaries of Doddershall Brook while the new channels re-establish. No baseline data available for the tributary. Localised adverse effects anticipated for tributaries.	The river diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach. No baseline data available for the tributaries. Potential beneficial effect anticipated, with no degradation of the element status at the scale of the water body.	No measurable effect on flow rates or dynamics anticipated from hydromorphological assessment unless watercourse is lengthened. This information will not be available until the detailed design stage. Given lack of baseline data a precautionary assessment of minor adverse has been applied.			No scheme elements on upstream water body	Scheme elements present on this water body are only located only on minor tributaries (drainage ditches) of Tetchwick Brook and of one of its tributaries, Doddershall Brook. River diversions are considered as having the potential for temporary adverse effects on the tributaries but would be balanced by the creation of new habitats within the diverted channels. The numerous culverts are identified as having an adverse effect locally on the tributaries but although there will be 400 m of culverts in total -they will be designed to ensure there is no change in flow regime downstream that could affect Tetchwick Brook. Furthermore, the tributaries (drainage ditches) have a relatively low contribution to the whole water body. No deterioration of this quality element is anticipated.	None required.	None required.		
	4. Fish	n/a	n/a		Temporary loss of 140 m of habitat on the tributaries while the new channels re-establish. No fish data available locally on the tributaries (drainage ditches). Localised adverse effects for tributaries anticipated.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities. No fish data available locally for the tributaries. Potential beneficial effect anticipated.	No measurable effect on flow rates or dynamics anticipated from hydromorphological assessment unless watercourse is lengthened. This information will not be available until the detailed design stage. Given lack of baseline data a precautionary assessment of minor adverse has been applied.			No scheme elements on upstream water body	Scheme elements present on this water body are only located only on minor tributaries (drainage ditches) of Tetchwick Brook and of one of its tributaries, Doddershall Brook. River diversions are considered as having the potential for temporary adverse effects on the tributaries but would be balanced by the creation of new habitats within the diverted channels. The numerous culverts are identified as having an adverse effect locally on the tributaries but although there will be 400 m of culverts in total -they will be designed to ensure there is no change in flow regime downstream that could affect Tetchwick Brook. Furthermore, the tributaries (drainage ditches) have a relatively low contribution to the whole water body. No deterioration of this quality element is anticipated.	None required.	None required.		
	Physico-Chemical status														
WFD classification elements	5. Dissolved Oxygen	Moderate	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body.	No likely impacts from reduction of groundwater levels by dewatering to contribution to surface water body as cutting is on unproductive strata	No likely impacts from reduction of groundwater levels by dewatering to contribution to surface water body as cutting is on unproductive strata	No scheme elements on upstream water body	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are considered temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	No significant effects	-
	6. pH	High	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact			No scheme elements on upstream water body					
	7. Phosphate	Bad	-		N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is	Receptor is insensitive to impact			No scheme elements on upstream water body					
	8. Ammonia	Good	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact			No scheme elements on upstream water body					
	9. Temperature	-	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact			No scheme elements on upstream water body					
	10. Specific Pollutants (Annex VIII)	-	-		N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact			No scheme elements on upstream water body					
	Hydromorphological status														**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics • Unnamed tributary of Doddershall Brook is a minor tributary of Doddershall Brook, and in practical terms represents a small proportion of the water body. • It is unclear whether proposed realignment would shorten the local channel reach or extend, although it appears that the diversion is an extension of the watercourse via a culvert at an embankment. • Lengthening the channel may reduce flow rates although the diversion is not far from the existing channel course. • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of lengthening the watercourse still needs to be flagged as a risk	No likely impacts from reduction of groundwater levels by dewatering to contribution to surface water body as cutting is on unproductive strata	N/A	No scheme elements on upstream water body	• Culverts and river diversions on small unnamed tributaries are unlikely to adversely impact flow rates and dynamics. However, as there are likely to be several hundred metres of culverts on the tributaries, including river diversions, which would amount to a significant proportion of the open watercourses of the water body, there is potential for local impact with the potential for cumulative impact on hydromorphology in the area, and therefore flagged as amber.	Hydromorphological surveys to be undertaken to aid detailed design development Hydromorphological mitigation should be incorporated into detailed design where practicable. Mitigation measures that might be incorporated into the detailed design include: • Create compensation habitats • Create low flow channels in over-widened/over-deepened channels • Create reed fringes • Introduce riparian vegetation/green corridors where space allows • Recreate a sinuous river channel (re-meandering) where space allows • Retain marginal vegetation • Use of engineering techniques to assist natural recovery • Use soft engineering techniques		Potential widespread or prolonged effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater		N/A	No scheme elements on upstream water body					
	13. River continuity	-	-		N/A	N/A	• Lengthening the channel may result in increased channel storage and reduced floodplain connectivity, but the size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected • The size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected		N/A	No scheme elements on upstream water body					
	14. River depth and width variation bed	-	-		N/A	N/A	• The diversion would replicate existing channel geometry. Out of channel flow depths may decrease as a result of lengthening the channel, but in practical terms there would be no significant change		N/A	No scheme elements on upstream water body					
	15. Structure and substrate of river bed	-	-		N/A	N/A	• Lengthening a channel tends to reduce flow rates and increase deposition of sediment • Given the size of the watercourse there would probably be no measurable impact		N/A	No scheme elements on upstream water body					
	16. Structure of riparian zone	-	-		N/A	N/A	• Although channel capacity would increase, there is likely to be no net change to existing bank, riparian and floodplain structure and connectivity with channel		N/A	No scheme elements on upstream water body					

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen		-	-	-	-	-	-	-	-	-	-
NONE	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Adam's Embankment culvert					River Diversion				Culvert					River Diversion			Cutting		Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB106039030100	Moderate	Good by 2027	Description of scheme element impact	River Ray: SWC-CFA12-9 (74+530) extension existing culvert - 50m					River Ray: river diversion (74+500) - no details available				Tributaries of River Ray: Lee Wood Farm Ditch - SWC-CFA12-10 (75+110) - culvert replacement (31 m), Muxwell Brook - SWC-CFA12-12 (76+730) - extension existing culvert - 24 m, Unnamed Tributary of Muxwell Brook - SWC-CFA12-11 (76+705) - culvert extension - 25 m, Greatmoor Ditch - culvert extension				Tributary of River Ray: Muxwell Brook - SWC-CFA12-12 (76+730), Greatmoor ditch (75+500 to 75+600) - small river diversion (no details), Unnamed Tributary of Muxwell Brook (76+000 to 76+250) - diversion (no details), Unnamed Tributary of River Ray (no details)		Culvert Cutting					
Ray and tributaries North East of Brendon Underwood			Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream		Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) to flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.			Construction	Operation		
1. Macrophytes and phytobenthos - diatoms	n/a	n/a	Predicted change in status elements (green = none, amber = possible, red = likely)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
2. Macrophytes and phytobenthos - macrophytes	n/a	n/a		Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to the loss of a maximum of 50 m of aquatic vegetation. Riparian vegetation. The River Ray supports very sparse aquatic vegetation on the stretch impacted (HS2 baseline survey). However, as culvert already existing, negligible effect likely to be negligible.	Likely to lead to the loss of macrophytes or emergent vegetation. The River Ray supports very sparse aquatic vegetation on the stretch impacted (HS2 baseline survey). However, as culvert already existing, negligible effect likely to be negligible.	Minor changes to flow dynamics given existing culvert, with no more than minor adverse effects at this location. The River Ray only supports very sparse aquatic vegetation on the stretch impacted (HS2 baseline survey). Potential adverse effect likely to be minor and localised.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	There will be loss of marginal and channel macrophytes over the length of the existing River Ray that lies within the diverted section, while the new channel re-establishes. The watercourse currently supports very sparse macroinvertebrate aquatic vegetation on the stretch impacted (HS2 baseline survey). Localised and temporary adverse effect anticipated.	A 40m zone up and downstream of the culvert will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by aquatic vegetation. The watercourse currently supports very sparse aquatic vegetation on the stretch impacted (HS2 baseline survey). Potential beneficial effect anticipated.	Effects on flow dynamics are considered insignificant. River Bay only supports very sparse aquatic vegetation on the stretch impacted (HS2 baseline survey). Potential minor beneficial effects anticipated locally.	Receptor not sensitive to impact. No likely effect anticipated.	As the culverts are already existing and will only be extended or replaced, these are likely to lead to the loss of macrophytes over very localised areas. Muxwell Brook currently supports very sparse macrophyte aquatic vegetation on the stretch impacted (HS2 baseline survey). Effect likely to be negligible.	As the culverts are already existing and will only be extended or replaced, these are likely to lead to the loss of macrophytes over very localised areas. Tributaries heavily shaded and with very few aquatic vegetation (ecology baseline survey). Effect likely to be negligible.	Likely to lead to very localised increase in flow velocities and homogenised flow patterns, with no significant effect at the scale of the water body. Tributaries heavily shaded and with very few aquatic vegetation (ecology baseline survey). Effect likely to be negligible.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	There will be loss of marginal and channel macrophytes over the length of the existing tributaries that lie within the diverted section, while the new channels re-establish. Baseline surveys showed low habitat fish quality and no fish was recorded for Muxwell Brook. No fish data available for the other tributaries. In addition, the River Ray is not a Freshwater Fish Directive designated water body. Potential adverse effect likely to be minor and very localised.	The new channels will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by aquatic vegetation. Tributaries heavily shaded and with very few aquatic vegetation (ecology baseline survey). Potential beneficial effect anticipated.	Potential reduction in flow rates and increase diversity of bed formations locally, with no significant effect at the scale of the water body. Muxwell Brook currently supports poor to moderate macrophyte aquatic vegetation (ecology baseline survey). No baseline data available for other tributaries. Potential minor beneficial effect anticipated, with no degradation of the element status at the scale of the water body.						
3. Macroinvertebrates	Moderate	Good by 2027		Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to the loss of a maximum of 50 m of macroinvertebrate habitat (i.e. streambed, riparian habitat). The River Ray supports very sparse macroinvertebrate aquatic vegetation on the stretch impacted (HS2 baseline survey). As culvert already existing, negligible effect anticipated.	No additional effect anticipated (loss of vegetation already considered in the landtake impact), locally or at the scale of the water body.	Minor changes to flow dynamics given existing culvert, with no more than minor adverse effects at this location. The watercourse currently supports poor macroinvertebrate aquatic vegetation. Potential adverse effect likely to be minor and localised.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Temporary loss of macroinvertebrate habitat over the length of the existing River Ray that lies within the diverted section, while the new channel re-establishes. The watercourse currently supports poor macroinvertebrate aquatic vegetation on the stretch impacted (HS2 baseline survey). Negligible effect anticipated (HS2 baseline survey). Localised and temporary adverse effect anticipated.	A 40m zone up and downstream of the culvert will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by aquatic species, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrates taxa that currently characterise the reach. The watercourse currently supports poor macroinvertebrate aquatic vegetation (HS2 baseline survey). Potential beneficial effect anticipated.	Effects on flow dynamics are considered insignificant. The watercourse currently supports poor macroinvertebrate quality (baseline surveys). Baseline surveys showed moderate habitat fish quality but no fish was recorded. The River Ray is not a Freshwater Fish Directive designated water body.	Receptor not sensitive to impact. No likely effect anticipated.	As the culverts are already existing and will only be extended or replaced, these are likely to lead to the loss of macroinvertebrates over very localised areas. Muxwell Brook currently supports poor to moderate macroinvertebrate aquatic vegetation (baseline surveys). No baseline data available for other tributaries. Potential adverse effect likely to be minor and very localised.	As the culverts are already existing and will only be extended or replaced, these are likely to lead to the loss of macroinvertebrates over very localised areas. Tributaries heavily shaded and with very few aquatic vegetation (ecology baseline survey). Effect likely to be negligible.	As additional effect anticipated (loss of vegetation already considered in the landtake impact), locally or at the scale of the water body.	Likely to lead to very localised increase in flow velocities and homogenised flow patterns, with no significant effect at the scale of the water body. Tributaries heavily shaded and with very few aquatic vegetation (ecology baseline survey). No baseline data available for other tributaries. Potential adverse effect likely to be minor and very localised.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Temporary loss of macroinvertebrate habitat over the length of the existing tributaries that lie within the diverted section, while the new channels re-establish. Baseline surveys showed poor to moderate macroinvertebrate aquatic vegetation. No baseline data available for other tributaries. Potential adverse effect anticipated, with no degradation of the element status at the scale of the water body.	The new channels will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by aquatic species, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrates taxa that currently characterise the reach. The watercourse currently supports poor macroinvertebrate aquatic vegetation. Muxwell Brook currently supports poor to moderate macroinvertebrate aquatic vegetation. No baseline data available for other tributaries. Potential beneficial effect anticipated.	Potential reduction in flow rates and increase diversity of bed formations locally, with no significant effect at the scale of the water body. Muxwell Brook currently supports poor to moderate macroinvertebrate aquatic vegetation. No baseline data available for other tributaries. Potential minor beneficial effect anticipated at a very localised scale.	• It is unlikely that Culvert cutting will impact surface water flows in the Ray and tributaries the area is on unproductive strata and therefore there is unlikely to be a significant groundwater contribution to surface water flow. • Any minor impacts on flow will be minor and localised and the reduction in contribution of flow from groundwater will only impact a small proportion of the watercourse	• It is unlikely that Culvert cutting will impact surface water flows in the Ray and tributaries the area is on unproductive strata and therefore there is unlikely to be a significant groundwater contribution to surface water flow. • Any minor impacts on flow will be minor and localised and the reduction in contribution of flow from groundwater will only impact a small proportion of the watercourse	No scheme elements on upstream water body	River diversions (400 m in total) on the tributaries of the River Ray have the potential for temporary adverse effects but would be balanced by the creation of new habitats within the diverted channels. The 4 culverts on the tributaries and on the River Ray are either replacements or extensions of existing structures and are therefore considered to have only very localised additional effects. Although no baseline data is available for the small tributaries (Grimage ditches), the effect of the scheme on this quality element is likely to be negligible, and would not lead to a deterioration of the WFD status of this quality element.	None required.	None required.	Potential minor and localised effects	
4. Fish	n/a	n/a		Localised and temporary effect during construction. No deterioration of the water body status of the element is however expected.	Likely to lead to the loss of a maximum of 50 m of fish habitat (i.e. streambed, riparian habitat). The River Ray supports poor fish habitat (EA fish survey data). However, as culvert already existing, it is not considered to constitute a further barrier to fish movements. Baseline surveys showed moderate habitat fish quality but no fish was recorded. The River Ray is not a Freshwater Fish Directive designated water body. As culvert already existing, very localised adverse effect anticipated.	No additional effect anticipated (loss of vegetation already considered in the landtake impact), locally or at the scale of the water body.	Minor changes to flow dynamics given existing culvert, with no more than minor adverse effects at this location. The watercourse currently supports poor macroinvertebrate aquatic vegetation. Potential adverse effect likely to be minor and localised.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Temporary loss of fish habitat over the length of the existing River Ray that lies within the diverted section, while the new channel re-establishes. The watercourse currently supports poor macroinvertebrate aquatic vegetation which could promote morphological diversity and allow the channel to regain a dynamic geometry and a stepped channel / pool-ruel channel. • The size of the channel suggests there could be significant loss of diversity in river depth and width, and this is a risk	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities. Baseline surveys showed moderate habitat fish quality but no fish was recorded. The River Ray is not a Freshwater Fish Directive designated water body. Potential beneficial effect anticipated.	Effects on flow dynamics are considered insignificant. Baseline surveys showed moderate habitat fish quality but no fish was recorded. The River Ray is not a Freshwater Fish Directive designated water body.	Localised and temporary effect during construction. No deterioration of the water body status of the element is however expected.	As the culverts are already existing and will only be extended or replaced, these are likely to lead to the loss of fish habitat over very localised areas. Muxwell Brook currently supports poor to moderate fish habitat (baseline surveys). No baseline data available for other tributaries. In addition, the River Ray is not a Freshwater Fish Directive designated water body. Potential adverse effect likely to be minor and very localised.	As the culverts are already existing and will only be extended or replaced, these are likely to lead to the loss of fish habitat over very localised areas. Tributaries heavily shaded and with very few aquatic vegetation (ecology baseline survey) and no fish was recorded for Muxwell Brook. No fish data available for the other tributaries. In addition, the River Ray is not a Freshwater Fish Directive designated water body. Potential adverse effect likely to be minor and very localised.	As additional effect anticipated (loss of vegetation already considered in the landtake impact), locally or at the scale of the water body.	Likely to lead to very localised increase in flow velocities and homogenised flow patterns, with no significant effect at the scale of the water body. Tributaries heavily shaded and with very few aquatic vegetation (ecology baseline survey) and no fish was recorded for Muxwell Brook. No fish data available for the other tributaries. In addition, the River Ray is not a Freshwater Fish Directive designated water body. Potential adverse effect likely to be minor and very localised.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Temporary loss of fish habitat over the length of the existing tributaries that lie within the diverted section, while the new channels re-establish. Baseline surveys showed low habitat fish quality and no fish was recorded for Muxwell Brook. No fish data available for the other tributaries. In addition, the River Ray is not a Freshwater Fish Directive designated water body. Potential adverse effect anticipated, with no degradation of current status anticipated.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities. Baseline surveys showed low habitat fish quality and no fish was recorded for Muxwell Brook. No fish data available for the other tributaries. In addition, the River Ray is not a Freshwater Fish Directive designated water body. Potential beneficial effect anticipated.	Potential reduction in flow rates and increase diversity of bed formations locally, with no significant effect at the scale of the water body. Muxwell Brook currently supports poor to moderate fish habitat (baseline surveys). No baseline data available for the other tributaries. Baseline surveys showed low habitat fish quality and no fish was recorded for Muxwell Brook. No fish data available for the other tributaries. In addition, the River Ray is not a Freshwater Fish Directive designated water body. Potential minor beneficial effect anticipated at a very localised scale.			No scheme elements on upstream water body	River diversions (400 m in total) on the tributaries of the River Ray have the potential for temporary adverse effects but would be balanced by the creation of new habitats within the diverted channels. The 4 culverts on the tributaries and on the River Ray are either replacements or extensions of existing structures and are therefore considered to have only very localised additional effects. Although no baseline data is available for the small tributaries (Grimage ditches), the effect of the scheme on this quality element is likely to be negligible, and would not lead to a deterioration of the WFD status of this quality element.	None required.	None required.	Potential minor and localised effects	
Physico-Chemical status																													
5. Dissolved Oxygen	Poor	-	Predicted change in status elements (green = none, amber = possible, red = likely)	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/localised effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, invoke/marginally improved dissolved oxygen levels. Overall effect likely to be minor with no degradation of current status anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	N/A	N/A	Due to the length of the proposed culverts, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/localised effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, invoke/marginally improved dissolved oxygen levels. Overall effect likely to be minor with no degradation of current status anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.			No scheme elements on upstream water body	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during the construction phase will ensure that there are no significant adverse or minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where the risk of pollution is high, or where treatment is required prior to unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	No significant effects	
6. pH	High	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact								
7. Phosphate	Poor	-		N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect).	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact								
8. Ammonia	Good	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact								
9. Temperature	-	-		N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on temperature. This impact is likely to have a minor/localised effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the proposed culverts, there is likely to be a minor impact on temperature. This impact is likely to have a minor/localised effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact								
10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect).	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.								
Hydromorphological status																													Hydromorphology Baseline
11. Quantity and dynamics of river flow	-	-		N/A	N/A	N/A	• There could be significant diversity of flow dynamics in the current culvert (heavily reeds at the moment). • Out of bank flows would be cutoff and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • The River Ray is small watercourse at this point, and in practical terms the culvert would impact a small proportion of the water body	N/A	• The extent of new watercourse that would be created, and the possible negative effects of altering existing channel conditions, mean that there would be no significant habitat creation	• Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics. • The crossing is near the upper reaches of the River Ray, and in practical terms represents a small proportion of the water body. • It is considered that the watercourse will be lengthened at an embankment. Lengthening the channel may reduce flow rates although the diversion is not far from the existing channel course. • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of lengthening the watercourse still needs to be flagged as a risk	N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity of flow dynamics. • The existing culverts on Lee Wood Ditch, Muxwell Brook and an unnamed tributary of Muxwell Brook are relatively short (between 20 m and 30 m long), and in practical terms the culvert would impact a small proportion of the water body	N/A	N/A	N/A	• Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics. • The tributaries of the River Ray (Muxwell Brook, Greatmoor ditch and unnamed tributary to Muxwell Brook) in practical terms represent a small proportion of the water body. • It is considered that the watercourse will be lengthened at an embankment. Lengthening the channel may reduce flow rates although the diversion is not far from the existing channel course. • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of lengthening the watercourse still needs to be flagged as a risk			N/A	No upstream water body impacted by the scheme		Undertake hydromorphological survey to aid detailed design development Incorporate mitigation measures into detailed design where practicable. Mitigation measures might include: • Bank re-profiling (rehabilitation) • Create reed fringes • Creation of shallow margin in front of hard defence • Create berms / benches • Introduce riparian vegetation/green corridors where space allows • Recreate a sinuous river channel (re-meandering) where space allows • Recreation of gravel bars and riffles using permanent and/or temporary bed structures (increase morphological diversity) • Use of flow deflectors • Use of engineering technique to assist natural recovery • Use soft engineering techniques	Potential minor and localised effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
12. Connection to Groundwater	-	-		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A		• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A		• Likely to be no significant relationship between hydromorphology and groundwater		N/A	No upstream water body impacted by the scheme					
13. River continuity	-	-		N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows from the channel, which may result in existing flow and habitat continuity within and adjacent to both sides of the channel, • However, in wider body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A	N/A		• Shortening the channel may result in accelerated flows and reduced channel storage capacity, which in turn could increase overbank spillage and floodplain connectivity downstream. • The size of the channel suggests the extent of the diversion mean that continuity is unlikely to be significantly affected	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows from the channel, which may result in existing flow and habitat continuity within and adjacent to both sides of the channel, • However, in wider body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A	N/A		• Shortening the channel may result in accelerated flows and reduced channel storage capacity, which in turn could increase overbank spillage and floodplain connectivity downstream • The size of the channel suggests the extent of the diversion mean that continuity is unlikely to be significantly affected	N/A	N/A	No upstream water body impacted by the scheme					
14. River depth and width variation and	-	-		N/A	N/A	N/A	• Out of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events. • The culvert would disconnect the channel from the riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status • Scour adjacent to the structure upstream and downstream could result in sharp changes in channel geometry and a stepped channel / pool-ruel channel. • The size of the channel suggests there could be significant loss of diversity in river depth and width, and this is a risk	N/A	N/A		• The diversion would replicate existing channel geometry. • Increasing flow rates may result in local scour of the bed and banks which would promote morphological diversity and allow the channel to regain a dynamic geometry and a stepped channel. • Some local scour and substrate deposition would promote morphological diversity • Overall , there is unlikely to be significant channel change	N/A	N/A	N/A	• Out of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events. • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A	N/A		• The diversion would replicate existing channel geometry. • Increasing flow rates may result in local scour of the bed and banks which would promote morphological diversity and allow the channel to regain a dynamic geometry and a stepped channel. • Some local scour and substrate deposition would promote morphological diversity • Overall , there is unlikely to be significant channel change	N/A	N/A	No upstream water body impacted by the scheme					
15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour, but bed structure could be homogenised • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	N/A		• Shortening the channel could increase gradients and sediment transport rates • This could result in loss of substrates in the shortened reach, but increased diversity of bed formations downstream could compensate possibly increased sediment deposition • The locally increased gradient could trigger bed scour upstream as the channel attempts to smooth its bed gradient • Given the size of the channel there is unlikely to be major adjustment, but this is still a risk	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	N/A		• Shortening the channel could increase gradients and sediment transport rates • This could result in loss of substrates in the shortened reach, but increased diversity of bed formations downstream could compensate possibly increased sediment deposition • The locally increased gradient could trigger bed scour upstream as the channel attempts to smooth its bed gradient • Given the size of the channel there is unlikely to be major adjustment, but this is still a risk			No upstream water body impacted by the scheme					
16. Structure of riparian zone	-	-		N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	N/A		• There is unlikely to be any net change to existing bank, riparian and floodplain structure and connectivity with channel	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	N/A		• There is unlikely to be any net change to existing bank, riparian and floodplain structure and connectivity with channel			No upstream water body impacted by the scheme					

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	Predicted change in status elements (green = none, amber = possible, red = likely)																									
NONE	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Impacts from other WFD water bodies (assessed separately) - Multiple scheme elements (Ray and tributaries North East of Grendon Underwood - GB106039030100)	Impacts from other WFD water bodies (assessed separately) - Multiple scheme elements (Tetchwick Brook, Source to Ray and tribs - GB106039030070)	OVERALL impact on element	Proposed Mitigation Measures		Residual impact	
	GB106039030060	Poor	Good by 2027	Description of scheme element impact				Construction	Operation		
	Ludgershall Brook and Muswellhill Brook			Identified biological impacts							
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	n/a	n/a	Predicted change to status elements (green = none, amber = possibly, red = likely)	n/a	n/a	n/a	n/a	n/a	n/a	
	2. Macrophytes and phytobenthos - macrophytes	n/a	n/a		Given the distance (6 km approximately) with the scheme elements present on the water body GB106039030100 and their localised potential effects, no effect anticipated on this quality element.	Given the distance (6 km approximately) with the scheme elements present on the water body GB106039030070 and their localised potential effects, no effect anticipated on this quality element.	This quality element has no WDF status. The scheme is not anticipated to have any significant effect on this quality element.	None required.	None required.	No significant effects	
	3. Macroinvertebrates	Poor	Good by 2027		Given the distance (6 km approximately) with the scheme elements present on the water body GB106039030100 and their very localised potential effects, no effect anticipated on this quality element.	Given the distance (6 km approximately) with the scheme elements present on the water body GB106039030070 and their localised potential effects, no effect anticipated on this quality element.	This quality element is currently of Poor status. The scheme is not anticipated to have any significant effect on this quality element, so the achievement of the WFD objectives should not be compromised.	None required.	None required.	No significant effects	
	4. Fish	n/a	n/a		Although scheme elements present on the water body GB106039030100 are distant from approximately 6 km, the watercourse is designated under the Freshwater Fish Directive. Culverts present on the upstream water body GB106039030100 have the potential of having a minor adverse effect on this element, by limiting access to upstream watercourses.	Although scheme elements present on the water body GB106039030070 are distant from approximately 9 km, the watercourse is designated under the Freshwater Fish Directive. Culverts present on the upstream water body GB106039030070 have the potential of having a minor adverse effect on this element, by limiting access to upstream watercourses.	This quality element has no WDF status. The scheme could have a very minor adverse effect on this quality element (due to culverting of upstream watercourses), but would not alter WFD status of this element.	None required.	None required.	Potential minor and localised effects	
	Physico-Chemical status										
WFD classification elements	5. Dissolved Oxygen	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	Given the distance (6 km approximately) with the scheme elements present on the water body GB106039030100 and their localised potential effects, no impact anticipated on this quality element.	Given the distance (6 km approximately) with the scheme elements present on the water body GB106039030070 and their localised potential effects, no effect anticipated on this quality element.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are considered temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	No significant effects	
	6. pH	-	-								
	7. Phosphate	-	-								
	8. Ammonia	-	-								
	9. Temperature	-	-								
	10. Specific Pollutants (Annex VIII)	-	-								
	Hydromorphological status										**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	Given the distance (6 km approximately) from the scheme elements present on the water body GB106039030100 and their localised potential effects, no impact anticipated on hydromorphology.	Given the distance (6 km approximately) from the scheme elements present on the water body GB106039030070 and their localised potential effects, no impact anticipated on hydromorphology.	Given the distance from the HS2 scheme, and only localised effects identified on the upstream WFD watercourse, there is unlikely to be any measurable hydromorphological impacts present.	None required.	None required.	No significant effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-								
	13. River continuity	-	-								
	14. River depth and width variation bed	-	-								
	15. Structure and substrate of river bed	-	-								
	16. Structure of riparian zone	-	-								

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen							
NOT REQUIRED FOR THIS ASSESSMENT	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	n/a	n/a	n/a	n/a	n/a	n/a

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	River Diversion - Watercourse M23			River Diversion - Tributary to S72/M23 near Shepherd's Furze Farm			Culvert - Watercourse M23					Culvert - Tributary to S72/M23 near Shepherd's Furze Farm				
GB105033030560	Good	Good Ecological Potential by 2015	Description of scheme element impact	Approximately four field drains and one pond may be lost or potentially affected by general construction works to the east of Calvert (SWC-CFA13-12, SWC-CFA13-15) .			Drain diversion and EWR realignment Embankment (SWC-CFA13-1, SWC-CFA13-13, SWC-CFA13-14).			Construction of approximately 7 culverts greater up to 200m in length proposed at Calvert IMD (SWC-CFA13-12, SWC-CFA13-15) - length >300m.					Culverting of watercourse and drain diversion (SWC-CFA13-1, SWC-CFA13-13, SWC-CFA13-14) - length >100m.				
Twin			Identified biological impacts	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
WFD classification elements	1. Macrophytes and phytobenthos - diatoms	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	-	-		- There will be loss of marginal and channel macrophytes over the length of the existing field ditch that lies within the diverted section. - No baseline data are available, but the macrophyte community will re-establish within 1 to 2 years of completion of the diversion. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised and only affect the minor ditch.	- The new channel will replicate and/or improve on existing habitat and where possible. -The effect on this quality element is considered to be minor positive.	- No hydromorphological effects anticipated and therefore no effect on macrophyte communities	-There will be loss of marginal and channel macrophytes over the length of the existing field ditch that lies within the diverted section. - No baseline data are available, but the macrophyte community will re-establish within 1 to 2 years of completion of the diversion. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. -Effects will be temporary and localised and only affect the minor ditch.	- The new channel will replicate and/or improve on existing habitat and where possible. -The effect on this quality element is considered to be minor positive.	- No hydromorphological effects anticipated and therefore no effect on macrophyte communities	- Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. - No baseline data available, but this is a small ditch in arable farmland which appears to be shaded by bankside trees and hedges and therefore not likely to support abundant aquatic macrophytes - Only minor and localised effects are anticipated.	- Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - No baseline data available, but this is a small ditch in arable farmland which appears to be shaded by bankside trees and hedges and therefore not likely to support abundant aquatic macrophytes The effects of shading will therefore be minimal.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert) may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. - No baseline data available, but this is a small ditch in arable farmland which appears to be shaded by bankside trees and hedges and therefore not likely to support abundant aquatic macrophytes - Only minor and localised effects are anticipated.	- Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - No baseline data available, but this is a small ditch in arable farmland which appears to be shaded by bankside trees and hedges and therefore not likely to support abundant aquatic macrophytes The effects of shading will therefore be minimal.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert) may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
	3. Macroinvertebrates	-	-		There will be temporary loss of macroinvertebrates and habitat over the length of the existing drain that lies within the diverted section. No baseline data are available from this minor ditch, but it will only to require less than 1 year to re-establish give the short distance affected. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised and only affect the minor ditch.	- The new channel will replicate and/or improve on existing habitat and where possible. -The effect on this quality element is considered to be minor positive.	- No hydromorphological effects anticipated and therefore no effect on macroinvertebrate communities	There will be temporary loss of macroinvertebrates and habitat over the length of the existing drain that lies within the diverted section. - No baseline data are available from this minor ditch, but it will only to require less than 1 year to re-establish give the short distance affected. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised and only affect the minor ditch.	- The new channel will replicate and/or improve on existing habitat and where possible. -The effect on this quality element is considered to be minor positive.	- No hydromorphological effects anticipated and therefore no effect on macroinvertebrate communities	Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrates and reduce the habitats available for colonisation within the culvert. -No baseline data were available but this is a small ditch in arable farmland is already heavily modified. There would only be minor and localised effects on invertebrates, with no effect on the WFD status of this element.	- Possible indirect effects on macroinvertebrates if macrophytes are lost due to shading. -Given that the ditches are heavily shaded, there would be no effects or negligible effects on invertebrates.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert) may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediate downstream area). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality. Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrates and reduce the habitats available for colonisation within the culvert. -No baseline data were available but this is a small ditch in arable farmland is already heavily modified. There would only be minor and localised effects on invertebrates, with no effect on the WFD status of this element.	- Possible indirect effects on macroinvertebrates if macrophytes are lost due to shading. -Given that the ditches are heavily shaded, there would be no effects or negligible effects on invertebrates.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert) may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediate downstream area). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
	4. Fish	-	-		There will be temporary loss of habitat over the < 50m length of the existing drain that lies within the diverted section. No baseline data are available, but given that this is a small ditch in arable farmland, only minor species will be present. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised and only affect the small ditch.	- The new channel will replicate and/or improve on existing habitat and where possible. -The effect on this quality element is considered to be minor positive.	- No hydromorphological effects anticipated and therefore no effect on fish communities	There will be temporary loss of habitat over the < 50m length of the existing drain that lies within the diverted section. -No baseline data are available, but given that this is a small ditch in arable farmland, only minor species will be present. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised and only affect the small ditch.	- The new channel will replicate and/or improve on existing habitat and where possible. -The effect on this quality element is considered to be minor positive.	- No hydromorphological effects anticipated and therefore no effect on fish communities	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - No fish data available, but given that this is a small ditch in arable farmland, there is only a limited potential for fish and only minor species are likely to be present. - Effects are likely to be temporary, minor and highly localised (if any), not affecting the main watercourse.	- Landtake is unlikely to result in direct mortality of fish but there will be direct loss of fish habitats available for colonisation within the culvert. - No fish data available, but given that this is a small ditch in arable farmland there is only a limited potential for fish and only minor species are likely to be present. The loss of habitat will only lead to very minor and localised effects, with no conceivable effects on the water body as a whole. Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the culvert).	- Given that the ditches are heavily shaded, there would be no effects or negligible effects on fish.	- Localised changes in flow dynamics (potential increased flow due to the straightened channel in the culvert) and the presence of the culvert have the potential to impede upstream passage of any migratory fish. - No fish data available, but given that this is a small ditch in an agricultural field there is only a limited potential for fish and only minor species are likely to be present. The effects of this impact would only be minor and localised, with no likely effect on the fish population of the overall water body.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality. Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - No fish data available, but given that this is a small ditch in arable farmland, there is only a limited potential for fish and only minor species are likely to be present. - Effects are likely to be temporary, minor and highly localised (if any), not affecting the main watercourse.	- Landtake is unlikely to result in direct mortality of fish but there will be direct loss of fish habitats available for colonisation within the culvert. - No fish data available, but given that this is a small ditch in arable farmland there is only a limited potential for fish and only minor species are likely to be present. The loss of habitat will only lead to very minor and localised effects, with no conceivable effects on the water body as a whole. - Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the culvert).	- Given that the ditches are heavily shaded, there would be no effects or negligible effects on fish.	- Localised changes in flow dynamics (potential increased flow due to the straightened channel in the culvert) and the presence of the culvert have the potential to impede upstream passage of any migratory fish. - No fish data available, but given that this is a small ditch in an agricultural field there is only a limited potential for fish and only minor species are likely to be present. The effects of this impact would only be minor and localised, with no likely effect on the fish population of the overall water body.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
Physico-Chemical status																			
WFD classification elements	5. Dissolved Oxygen	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor with no degradation of current status anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor with no degradation of current status anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	N/A	N/A	Due to the length of the proposed culverts, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Due to the length of the proposed culverts, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
	6. pH	-	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	7. Phosphate	-	-		N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact
	8. Ammonia	-	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	9. Temperature	-	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact
	10. Specific Pollutants (Annex VIII)	-	-		N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
Hydromorphological status																			
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• The size of the channels means there are unlikely to be significant diversity of flow dynamics • The channel appears to be connected to a former gravel pit and this is likely to be the main hydraulic influence • The subject watercourses are tributaries to the principal watercourse of the water body that is described in the RBMP. The 'RBMP watercourse' is only 1.3km, so extensive impacts on tributaries would certainly have an adverse effect on hydromorphology at water body scale • Drainage from the developed site to the principal watercourse of the water body will presumably be managed to existing (pre-development) rates	N/A	• The extent of new watercourse that would be created, and the possible negative effects of altering existing channel conditions, mean that there would be no significant in-channel habitat creation	• Drain is a straight channel and appears to be 2m wide or less, so there is unlikely to be significant diversity of flow dynamics, or indeed much flow. • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable	N/A	N/A	N/A	• The subject watercourse is a tributary to the principal watercourse of the water body that is described in the RBMP. The 'RBMP watercourse' is only 1.3km, so extensive impacts on tributaries would certainly have an adverse effect on hydromorphology • The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • The tributaries are effectively drainage ditches within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	N/A	N/A	N/A	• The subject watercourse is a tributary to the principal watercourse of the water body that is described in the RBMP. The 'RBMP watercourse' is only 1.3km, so extensive impacts on tributaries would certainly have an adverse effect on hydromorphology • The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness.	N/A
	12. Connection to Groundwater	-	-		N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A		• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A
	13. River continuity	-	-		N/A	N/A	• The scale of development could result in loss of watercourses that, although effectively field drains, would still represent a significant proportion of a small water body	N/A		• The minor drain diversion is unlikely to affect habitat continuity	N/A	N/A	N/A	• The culverts would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • The extensive culvert would affect a significant proportion of a small water body	N/A
	14. River depth and width variation bed	-	-		N/A	N/A		N/A		• The diversion would replicate existing channel geometry	N/A	N/A	N/A	• The size of the channels suggests there would not be significant loss of diversity in river depth and width, but the extent of culverts in proportion to the size of the water body are bound to have a negative impact • Out-of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events	N/A	N/A	N/A	N/A	• The size of the channels suggests there would not be significant loss of diversity in river depth and width, but the extent of culverts in proportion to the size of the water body are bound to have a negative impact • Out-of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events	N/A
	15. Structure and substrate of river bed	-	-		N/A	N/A		N/A		• Given the size of the watercourse there would probably be no measurable impact	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour, but the extents of culverts in proportion to the size of the water body are bound to have a negative impact • If the culvert bases are set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour, but the extents of culvert in proportion to the size of the water body are bound to have a negative impact • If the culvert bases are set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A
	16. Structure of riparian zone	-	-		N/A	N/A		N/A	• There is an opportunity to implement improved riparian habitat as a result of the diversion. For example by fencing off the channel to allow a vegetated riparian corridor habitat to develop, with additional benefits of riparian buffer strips on water quality	• Channel is in agricultural land, and riparian zones are composed of intermittent and discontinuous small trees and shrubs. • There is unlikely to be any detrimental effect on existing riparian habitat if it relocated	N/A	N/A	N/A	• The culverts would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel, for a large proportion of the overall water body	N/A	N/A	N/A	N/A	• The culvert would disconnect the channel from the riparian zones and sever any existing riparian habitat continuity along the channel, for a significant proportion of the overall water body	N/A

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NONE predicted to be Good Ecological Potential by 2015 (based on Expert Judgement).	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Siphon - Sherpherds Furze Inverted Siphon					Calvert Cutting		Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	-
GB105033030560	Good	Good Ecological Potential by 2015	Description of scheme element impact	Sherpherds Furze Inverted Siphon (SWC-CFA13-1, SWC-CFA13-13, SWC-CFA13-14) - length of 105m.					Cutting on unproductive strata and therefore unlikely to be influence on contribution to SW from bedrock aquifer. Possible local reduction in contribution from shallow groundwater.				Construction	Operation		
Twin			Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due	Change in water quality due to discharge of groundwater to a surface water body.						
WFD classification elements	1. Macrophytes and phytobenthos - diatoms	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	-	-		- Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the syphon. - No baseline data available, but this is a small ditch in arable farmland which appears to be shaded by bankside trees and hedges and therefore not likely to support abundant aquatic macrophytes - Only minor and localised effects are anticipated.	- Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - No baseline data available, but this is a small ditch in arable farmland which appears to be shaded by bankside trees and hedges and therefore not likely to support abundant aquatic macrophytes The effects of shading will therefore be minimal.	- Localised changes in flow dynamics (potential increased flow and scour due to hydraulic effects of the syphon) may result in changes to macrophyte communities within the immediate vicinity of the syphon (notably in immediate downstream area). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	No likely effect on surface water	No likely effect on surface water	No upstream water bodies	- The Twin watercourse does not currently have a WFD status for macrophytes and no baseline data were available. - Although the scheme will lead to a loss of habitat and photosynthetic activity (in shaded areas) due to culverts and siphons, this is only on minor ditches in arable farmland (most of which are heavily shaded) rather than on the main Twins water body itself. - All of the effects identified are minor and localised when considered individually. - Taking into account embedded mitigation (such as the inclusion of habitat creation upstream and downstream of culverts), it is anticipated that cumulative effect of all the different scheme elements will be minor and localised (only affecting several field drains in arable fields that are already heavily modified and will not contribute significantly to the wider water body), with no change to the current status of this element.	None required.	None required.	Minor and localised effects	-
	3. Macroinvertebrates	-	-		Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrates and reduce the habitats available for colonisation within the syphon. -No baseline data were available but this is a small ditch in arable farmland is already heavily modified. There would only be minor and localised effects on invertebrates, with no effect on the WFD status of this element.	- Possible indirect effects on macroinvertebrates if macrophytes are lost due to shading. - Given that the ditches are heavily shaded, there would be no effects or negligible effects on invertebrates.	- Localised changes in flow dynamics (potential increased flow and scour due to the hydraulic effects of the syphon) may result in changes to macroinvertebrate communities within the immediate vicinity of the syphon (notably in immediate downstream area). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal..	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	No likely effect on surface water	No likely effect on surface water	No upstream water bodies	The Twin watercourse does not currently have a WFD status for macroinvertebrates and no baseline data were available. - Although the scheme will lead to a loss of habitat due to culverts and the siphon, this is only on minor ditches in arable farmland (all of which are heavily modified) rather than on the main Twins water body itself. - All of the effects identified are minor and localised when considered individually. - Taking into account embedded mitigation (such as the inclusion of habitat creation upstream and downstream of culverts), it is anticipated that cumulative effect of all the different scheme elements will be minor and localised (only affecting several field drains in arable fields that are already heavily modified and will not contribute significantly to the wider water body), with no change to the current status of this element.	None required.	None required.	Minor and localised effects	-
	4. Fish	-	-		- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - No fish data available, but given that this is a small ditch in arable farmland there is only a limited potential for fish and only minor species are likely to be present. The loss of habitat will only lead to very minor and localised effects, with no conceivable effects on the water body as a whole. - Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the syphon).	- Landtake is unlikely to result in direct mortality of fish but there will be direct loss of fish habitats available for colonisation within the syphon. - No fish data available, but given that this is a small ditch in arable farmland there is only a limited potential for fish and only minor species are likely to be present. The loss of habitat will only lead to very minor and localised effects, with no conceivable effects on the water body as a whole. - Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the syphon).	- Given that the ditches are heavily shaded, there would be no effects or negligible effects on fish.	- Localised changes in flow dynamics (potential increased flow due to the hydraulic effects of the syphon) and the presence of the syphon have the potential to impede upstream passage of any migratory fish. - No fish data available, but given that this is a small ditch in an agricultural field there is only a limited potential for fish and only minor species are likely to be present. The effects of this impact would only be minor and localised, with no likely effect on the fish population of the overall water body.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	No likely effect on surface water	No likely effect on surface water	No upstream water bodies	- The Twin watercourse does not currently have a WFD status for fish and no baseline data were available. - Although the scheme will lead to a loss of habitat due to culverts and the siphon, this is only on minor ditches in arable farmland (all of which are heavily modified and will only support minor species) rather than on the main Twins water body itself. - All of the effects identified are minor and localised when considered individually. - Taking into account embedded mitigation (such as the inclusion of habitat creation upstream and downstream of culverts) it is anticipated that cumulative effect of all the different scheme elements will be minor and localised (only affecting several field drains in arable fields that are already heavily modified and will not contribute significantly to the wider water body), with no change to the current status of this element.	None required.	None required.	Minor and localised effects	-
	Physico-Chemical status															
WFD classification elements	5. Dissolved Oxygen	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	Due to the length of the proposed siphon/culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	No likely effect on surface water	No likely effect on surface water	No upstream water bodies	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	Minor and localised effects	-
	6. pH	-	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No likely effect on surface water	No likely effect on surface water	No upstream water bodies						
	7. Phosphate	-	-		N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	No likely effect on surface water	No likely effect on surface water	No upstream water bodies						
	8. Ammonia	-	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No likely effect on surface water	No likely effect on surface water	No upstream water bodies						
	9. Temperature	-	-		N/A	N/A	Due to the length of the proposed siphon/culvert, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	No likely effect on surface water	No likely effect on surface water	No upstream water bodies						
	10. Specific Pollutants (Annex VIII)	-	-		N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	No likely effect on surface water	No likely effect on surface water	No upstream water bodies						
	Hydromorphological status															**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity of flow dynamics • The channel appears to be connected to a former gravel pit and this is likely to be the main hydraulic influence • Out of bank flows would be cut-off and siphon boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • The siphon would severely disrupt in-channel flow processes with implications for accelerating and surcharging flows and increasing flow pressure through the siphon. and backing-up flow upstream and flow 'normalising' downstream • The channel is effectively a drainage ditch and size of the channel suggests there would not be significant loss of diversity in river depth, width and habitats	N/A	No likely effect on surface water	No likely effect on surface water	No upstream water bodies	• The nature of impacts, i.e. potential loss of drainage ditches and a pond ,extensive culverting and a siphon would result in extensive loss and deterioration of hydromorphological conditions • The subject watercourses are tributaries to the principal watercourse of the water body that is described in the RBMP. The 'RBMP watercourse' is only 1.3km, so extensive impacts on tributaries are likely to have adverse effects on hydromorphology at water body scale	Undertake hydromorphological surveys to aid detailed design development. Incorporate hydromorphological mitigation measures into detailed design where practicable. Mitigation measures might include: • Bank re-profiling (rehabilitation) • Create reed fringes • Creation of shallow margin in front of hard defence • Install silt, sand or gravel traps • Introduce riparian vegetation/green corridors where space allows • Recreate a sinuous river channel (re-meandering) where space allows • Recreation of gravel bars and riffles using permanent and/or temporary bed structures (increase morphological diversity) • Retain marginal vegetation • Use of engineering techniques to assist natural recovery • Use soft engineering techniques	Potential widespread or prolonged adverse effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	No likely effect on surface water	No likely effect on surface water	No upstream water bodies				
	13. River continuity	-	-		N/A	N/A	N/A	• The siphon would disconnect floodplains and out-of bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel, although the nature of the channel (downstream of a pond, and likely to have been modified historically to improve land-drainage for agriculture) means there is probably little out of channel flow. • In-channel flow and sediment dynamics would also have sharp discontinuities • The channel is effectively a drainage ditch and size of the channel suggests there would not be significant loss of diversity in river depth, width and habitats	N/A	No likely effect on surface water	No likely effect on surface water	No upstream water bodies				
	14. River depth and width variation bed	-	-		N/A	N/A	N/A	• Channel width and depth would be constrained through the siphon • Out-of bank flows would be severed by the siphon, and in-channel flows would be constrained • The size of the channel suggests there would not be significant loss of diversity in river depth and width, but this is still a risk	N/A	No likely effect on surface water	No likely effect on surface water	No upstream water bodies				
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour • Localised scour could be triggered downstream of the siphon, which could result in diversity of bed formations downstream, and bed protection may be necessary to ensure the hydraulic function of the culvert	N/A	No likely effect on surface water	No likely effect on surface water	No upstream water bodies				
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	• The siphon would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor watercourse and in practical terms may not impact on deterioration of water body status	N/A	No likely effect on surface water	No likely effect on surface water	No upstream water bodies				

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NONE predicted to be Good Ecological Potential by 2015 (based on Expert Judgement).	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Culvert - S75 (tributary of Padbury Brook) near Portway Farm						River Diversion - S75 (tributary of Padbury Brook) near Portway Farm .						Culvert - on Watercourse S76						Viaduct - Padbury Brook and trib north-east of Twyford						Culvert - on tributary to Padbury Brook north of Twyford					
GB105033038210	Moderate	Good Ecological Potential by 2021	Description of scheme element impact	*Construction on S75 (tributary of Padbury Brook) near Portway Farm (SWC-CFA13-2, SWC-CFA13-17, SWC-CFA13-18, SWC-CFA13-20). Extension of existing railway culvert. New culvert on the access road south of Portway Farm. Perry Road Hill overbridge foundation works. Realignment and widening of bridge. New Culvert and diversion under route north of Portway Farm including access roads (SWC-CFA13-2). Drainage water discharge from balancing ponds. Length of culverts = 57m + 28m + 9m = 94m.*						*Realignment of watercourse during widening of bridge and new culvert and diversion under route north of Portway Farm including access roads (SWC-CFA13-2, SWC-CFA13-17, SWC-CFA13-18 and SWC-CFA13-20).*						*New Culvert under Twyford Embankment on Watercourse S76 (SWC-CFA13-3) named Twyford East Embankment culvert. Length of watercourse covered by construction = 50m*						*Viaduct crossing Padbury Brook (SWC-CFA13-4) and a small (drain) trib (SWC-CFA13-5) north East of Twyford. No footings in channel of either watercourse, but the small drain will require a short diversion (< 50 m), assessed separately*						*New Culvert access road at Twyford Viaduct (SWC-CFA13-4) - approximately 40m of watercourse covered by construction.*					
Padbury Brook (The Twins)			Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
WFD classification elements	1.Macrophytes and phytobenthos diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes				Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. - No baseline data available, but this appears to be a man made drainage ditch with existing culverts and therefore only minor and localised effects are anticipated	- Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect the macrophyte communities present. - As this is only a small drain that is already culverted in various locations, effects will be minimal	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert) may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediate downstream area). This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	-There will be loss of marginal and channel macrophytes over the < 50m length of the existing drain that lies within the diverted section. - No baseline data are available, but the macrophyte community will re-establish within 1 to 2 years of completion of the diversion. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. -Effects will be temporary and localised and only affect the minor drain.	- The new channel will replicate existing habitat and where possible incorporate marginal berms to encourage the re-establishment of marginal and the channel to include a range of habitats suitable for colonisation by submerged species. -The effect on this quality element is considered to be minor positive.	-No hydromorphological effects anticipated and therefore no effect on macrophyte communities	Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - No baseline data available, but as this is a short culvert on a minor tributary only minor and localised effects are anticipated.	- Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect the macrophyte communities present. - No baseline data available, but as this is a short culvert on a minor tributary only minor and localised effects are anticipated.	- Localised changes in flow dynamics may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	- The viaduct will not construct flow and piers will be located outside of the main channel. - The footings may be near to the bank but will not result in the loss of marginal or channel habitats. - The impact of the diversion is considered separately.	Baseline surveys indicate rich and abundant channel and marginal macrophyte communities in the area There may be minor changes in the cover and composition of macrophyte communities, but this is not considered to be greater than a minor localised change.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. - Macrophytes abundant and diverse in certain areas of the watercourse, but other areas appear to be of low distance affected and there would only be minor and localised effects. - Embedded mitigation measures include works to improve river habitat immediately upstream and downstream of the culvert.	- Shading of the channel will reduce photosynthetic activity and therefore affect the macrophyte communities present. - Baseline surveys that certain areas of the watercourse are characterised by rich macrophyte cover, but there would only be a localised effects from the scheme element, not affecting the status of this quality element.	- Localised changes in flow dynamics may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream). This would only be affect a limited distance and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
	3. Macroinvertebrates	Good	-		Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrates and reduce the habitats available for colonisation within the culvert. -No baseline data were available. Given that this is a small drain that is already modified and culverted, there would only be minor and localised effects on invertebrates, with no effect on the WFD status of this element.	- Possible indirect effects on macroinvertebrates if macrophytes are lost due to shading -Given that this is a small drain that is already modified and culverted, there would be no effects or negligible effects on invertebrates.	Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert) would result in no adverse or negligible effects to macroinvertebrate communities.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	There will be temporary loss of macroinvertebrates and habitat over the < 50m length of the existing drain that lies within the diverted section. - No baseline data are available, but as this is a short culvert on a minor tributary, and only minor and localised effects are anticipated.	- The diversion will replicate existing habitat and where possible will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach.	- No hydromorphological effects anticipated and therefore no effect on macroinvertebrate communities	Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrate habitats within the culvert. - No baseline data available, but as this is a short culvert on a minor tributary and only minor and localised effects are anticipated.	Macroinvertebrate community may be slightly altered due to shading effects on macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	- Localised changes in flow dynamics may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediate downstream area). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	- The viaduct will not construct flow and piers will be located outside of the main channel. - The footings may be near to the bank but will not result in the loss of marginal or channel habitats. - The impact of the diversion is considered separately.	- Macroinvertebrate community may be slightly altered due to shading effects on macrophyte communities (which form a significant component of invertebrate habitat is this area, following baseline survey data), but this is considered to be localised and minor.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrates and reduce the habitats available for colonisation within the culvert. - Baseline invertebrate data indicate good invertebrate quality. Given that relatively little distance affected and the invertebrate community present, there would only be highly localised effects. - Embedded mitigation measures include works to improve river habitat immediately upstream and downstream of the culvert.	- Macroinvertebrate community may be slightly altered due to shading effects on macrophyte communities (which form a significant component of invertebrate habitat is this area, following baseline survey data), but this is considered to be localised and minor.	- Localised changes in flow dynamics may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediate downstream). - This would only be affect a limited distance and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
	4. Fish	High	-		- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - No fish data available, but given that this is a small drain there is only a limited potential for fish and only minor species are likely to be present Effects are likely to be temporarily, low and highly localised.	- Landtake is unlikely to result in direct mortality of fish but there will be direct loss of fish habitats available for colonisation within the culvert. - No fish data available, but given that this is a small drain there is only a limited potential for fish and only minor species are likely to be present. The loss of habitat will only lead to very minor and localised effects, with no effects on the water body as a whole. - Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the culvert).	Shading will only have negligible or no effects on fish.	- Localised changes in flow dynamics (potential increased flow due to the straightened channel in the culvert) have the potential to impede upstream passage of any migratory fish - No fish data available, but given that this is a small drain there is only a limited potential for fish and only minor species are likely to be present. The effects of this impact would only be minor and localised, with no likely effect on the fish population of the overall water body.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	There will be temporary loss of habitat over the < 50m length of the existing drain that lies within the diverted section. - No baseline data are available, but given that this is a minor drain, only minor species will be present. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. -Effects will be temporary and localised and only affect the minor drain.	- The diversion will replicate existing habitat and where possible be designed to include a range of habitats that are suitable for the fish species present The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities.	- No hydromorphological effects anticipated and therefore no effect on fish communities	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - Fish in tributary poor, only minor species present Effects are likely to be temporary and localised	- Localised habitat loss. Low dynamics likely to be minimal as there is already several existing crossings (culverts), the culvert extension will be appropriately sized, and it is not likely that the extension will act as a barrier to fish migration. - No significant effects are therefore anticipated.	Shading will only have negligible or no effects on fish.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- Possible temporary sub-lethal effects on fish (e.g. displacement from impacted area). - Baseline survey showed a moderate diversity of minor fish species and good habitat. - Effects are likely to be temporary and localised	- The viaduct will not construct flow and piers will be located outside of the main channel. - The footings may be near to the bank but will not result in the loss of marginal or channel habitats. - The impact of the diversion is considered separately.	- Possible minor and localised effects on fish, as macrophyte communities are rich and abundant in the area and are likely to provide locally important habitats for fish	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- Possible temporary sub-lethal effects on fish (e.g. displacement from impacted area). - No data available on fish or fish habitat in the watercourse However, effects are likely to be temporary and localised with no impact on the water body as a whole	- Landtake is unlikely to result in direct mortality of fish but there will be direct loss of fish habitats available for colonisation within the culvert. - Given the relatively short distance affected and the invertebrate community present, there would only be highly localised effects. - Embedded mitigation measures include works to improve river habitat immediately upstream and downstream of the culvert.	- Possible minor and localised effects on fish, as macrophyte communities are rich and abundant in the area and are likely to provide locally important habitats for fish	- Localised changes in flow dynamics (potential increased flow due to the straightened channel in the culvert) have the potential to impede upstream passage of any migratory fish. - There is very limited information on the design of the culvert and but the fish element is of 'High' WFD status, and the baseline surveys found that a diverse assemblage of mostly minor species, and the stream has also supported Bullhead. As thus there are possible effects on the WFD status of this element of the water body, based on a highly precautionary approach due to the absence of sufficient baseline data - Therefore, it is essential that mitigation measures are considered so that the culvert is designed and positioned so to allow for fish passage.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
	Physico-Chemical status																															
	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	Due to the length of the proposed culverts, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor locally, with no degradation of the element status anticipated at the scale of the water body.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
	6. pH	High	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	7. Phosphate	Moderate	-		N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphates.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact
	8. Ammonia	High	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	9. Temperature	-	-		N/A	N/A	Due to the length of the culverts, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
	Hydromorphological status																															
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	N/A	• There could be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • S75 is a small watercourse and effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	N/A	• The extent of new watercourse that would be created, and the possible negative effects of altering existing channel conditions, mean that there would be no significant habitat creation	• Assumed that watercourse is realigned through culvert in embankment. Channel width appears to be 2m or less, so there is not likely to be significant change in flow dynamics. • S75 is a minor tributary of Padbury Brook, and in practical terms represents a small proportion of the water body • Lengthening the channel may reduce flow rates although the diversion is not far from the existing channel course • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of lengthening the watercourse still needs to be flagged as a risk	N/A	N/A	N/A	There could be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • S76 is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • The tributary to Padbury Brook is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A		• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A
	13. River continuity	-	-		N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in wider body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A	N/A		• Lengthening the channel may result in increased channel storage and reduced floodplain connectivity, but the size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in wider body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A	N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in wider body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A
	14. River depth and width variation	-	-		N/A	N/A	N/A	• Out-of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The culvert would homogenise channel morphology • Scour adjacent to the structure upstream and downstream could result in sharp changes in channel geometry and a stepped channel / perched culvert base • The size of the channel suggests there could be significant loss of diversity in river depth and width, and this is a risk	N/A	N/A		• The diversion would replicate existing channel geometry. Out of channel flow depths may decrease as a result of lengthening the channel, but in practical terms there would be no significant change	N/A	N/A	N/A	• Out-of-bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The culvert would homogenise channel morphology • Scour adjacent to the structure upstream and downstream could result in sharp changes in channel geometry and a stepped channel / perched culvert base • The size of the channel suggests there could be significant loss of diversity in river depth and width, and this is a risk	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	• Out-of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour , but bed structure could be homogenised • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	N/A		• Lengthening a channel tends to reduce flow rates and increase deposition of sediment • Given the size of the watercourse there would probably be no measurable impact	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour, but bed structure could be homogenised • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any connectivity of riparian vegetation along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	N/A		• Although channel capacity would increase, there is likely to be no net change to existing bank, riparian and floodplain structure and connectivity with channel	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any connectivity of riparian vegetation along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	N/A	N/A	N/A		N/A	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any connectivity of riparian vegetation along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	Predicted change to status elements (green = none, amber = possible, red = likely)																													
NONE	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Culvert - on unnamed drain running parallel to Padbury Brook					River Diversion - unnamed drain running parallel to Padbury Brook				River Diversion - Tributary of Padbury Brook near Three Bridge Mill			Viaduct - Padbury Brook east of Godington(footings in or within riparian zone of watercourse)					River Diversion - Padbury Brook east of Godington			Culvert - on unnamed watercourse east of Godington				
GB105033038210	Moderate	Good Ecological Potential by 2021	Description of scheme element impact	*New Culvert for access road at Twyford Viaduct (SWC-CFA13-5) - approximately 80m of watercourse covered by construction.*					*Diversion works on unknown drain running parallel to Padbury Brook (SWC-CFA13-5).*				*Diversion of tributary of Padbury Brook near Three Bridge Mill (SWC-CFA13-6) at Cowley embankment and stockpile.*			*Viaduct 20m in length at Padbury Brook east of Godington (SWC-CFA13-8)*					*Diversion of watercourse with construction of viaduct (SWC-CFA13-9)*			*New Culvert (SWC-CFA13-7) - approximately 50m of watercourse covered by construction.*				
Padbury Brook (The Twins)			Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
WFD classification elements	1.Macrophytes and phytobenthos diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	-	-		Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel) is likely to be minimal as there is already several existing crossings (culverts), the culvert extension will be appropriately sized, and it is not likely that the extension will act as a barrier to fish migration. - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- There will be loss of marginal and channel macrophytes over the length of the existing drain that lies within the diverted section. - No baseline data are available, but the macrophyte community will re-establish within 1 to 2 years of completion of the diversion. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised and only affect the minor drain.	- The new channel will replicate existing habitat and where possible incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. - The effect on this quality element is considered to be minor positive.	- Minor hydromorphological effects anticipated with no likely effect on macrophyte communities of small drain.	- There will be loss of marginal and channel macrophytes over the length of the existing drain that lies within the diverted section. - No baseline data are available, but the macrophyte community will re-establish within 1 to 2 years of completion of the diversion. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised and only affect the minor drain.	- The new channel will replicate existing habitat and where possible incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. -The effect on this quality element is considered to be minor positive.	- Minor hydromorphological effects anticipated with no likely effect on macrophyte communities of small drain.	N/A	N/A	N/A	N/A	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- There will be loss of marginal and channel macrophytes over the c 20m length of the existing Padbury Brook that lies within the diverted section. - Only limited baseline data are available, but the macrophyte community will re-establish within 1 to 2 years of completion of the river diversion. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised	- The new channel will replicate existing habitat and where possible incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. The effect on this quality element is considered to be minor positive.	- Minor hydromorphological effects anticipated with no likely effect on macrophyte communities of small drain.	- Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - No baseline data available, but this is a small link that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Localised changes in flow dynamics may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). No baseline data available, but this is a small link that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
	3. Macroinvertebrates	Good	-		Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrate habitats within the culvert. - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Macroinvertebrate community may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor. - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel) is likely to be minimal as there is already several existing crossings (culverts), the culvert extension will be appropriately sized, and it is not likely that the extension will act as a barrier to fish migration. - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- There will be temporary loss of macroinvertebrates and habitat over the length of the existing drain that lies within the diverted section. - No baseline data are available, but this is a minor drain, only minor species will be present. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised and only affect the minor drain.	- The diversion will replicate existing habitat and where possible will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach.	- Minor hydromorphological effects anticipated with no likely effect on macroinvertebrate communities of small drain.	- There will be temporary loss of macroinvertebrates and habitat over the length of the existing drain that lies within the diverted section. - No baseline data are available, but this is a minor drain, only minor species will be present. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised and only affect the minor drain.	- The diversion will replicate existing habitat and where possible will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach.	- Minor hydromorphological effects anticipated with no likely effect on macroinvertebrate communities of small drain.	- Receptor is insensitive to impact	- The Godington East Viaduct at SWC-CFA13-8 will not constrict flow and piers will be located outside of the main channel. - The footings may be near to the bank but will not result in the loss of marginal or channel habitats. - The Godington West Viaduct at SWC-CFA13-9 will require a short diversion but no footings will be present in the diverted channel. The impact of the diversion is considered separately.	N/A	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- There will be loss of marginal and channel macrophytes over the c 20m length of the existing Padbury Brook that lies within the diverted section. - A relatively diverse fish community is recorded, which is likely to require less than 1 year to re-establish give the short distance affected. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised	- The new channel will replicate existing habitat and where possible will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach.	- Minor hydromorphological effects anticipated with no likely effect on macroinvertebrate communities of small drain.	- Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrates habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - No baseline data available, but this is a small link that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Macroinvertebrate community may be slightly altered due to shading effects on macrophyte communities (which form a significant component of invertebrate habitat in this area, following baseline survey data), but this is considered to be localised and minor. - No baseline data available, but this is a small link that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Localised changes in flow dynamics may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediate downstream area). No baseline data available, but this is a small link that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
	4. Fish	High	-		- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Landtake will reduce the availability of fish habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Fish in tributary poor, only minor species present.	Shading will only have negligible or no effects on fish.	- Fish in tributary poor, only minor species present. - Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel) is likely to be minimal as there is already several existing crossings (culverts), the culvert extension will be appropriately sized, and it is not likely that the extension will act as a barrier to fish migration. - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	There will be temporary loss of habitat over the length of the existing drain that lies within the diverted section. - No baseline data available, but given that this is a minor drain, only minor species will be present. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised and only affect the minor drain.	- The diversion will replicate existing habitat and where possible will be designed to include a range of habitats that are suitable for the fish species present The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities.	- Minor hydromorphological effects anticipated with no likely effect on fish communities of small drain.	There will be temporary loss of habitat over the length of the existing drain that lies within the diverted section. - No baseline data are available, but given that this is a minor drain, only minor species will be present. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised and only affect the minor drain.	- The diversion will replicate existing habitat and where possible will be designed to include a range of habitats that are suitable for the fish species present The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities.	- Minor hydromorphological effects anticipated with no likely effect on fish communities of small drain.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - Baseline survey showed a moderate diversity of minor fish species and good habitat. - Effects are likely to be temporary and localised	- The Godington East Viaduct at SWC-CFA13-8 will not constrict flow and piers will be located outside of the main channel. - The footings may be near to the bank but will not result in the loss of marginal or channel habitats. - The Godington West Viaduct at SWC-CFA13-9 will require a short diversion but no footings will be present in the diverted channel. The impact of the diversion is considered separately.	N/A	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- There will be temporary loss of fish habitat over the c 20m length of the existing Padbury Brook that lies within the diverted section. - A relatively diverse fish community is recorded, which is likely to require less than 1 year to re-establish give the short distance affected. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised	- The river diversion will replicate existing habitat and where possible be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach.	- Minor hydromorphological effects anticipated with no likely effect on fish communities of small drain.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - No baseline data available, but this is a trib. drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Landtake will reduce the availability of fish habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. Fish in tributary poor, only minor species present. - No baseline data available, but this is a small link that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Shading will only have negligible or no effects on fish.	- Localised changes in flow dynamics likely to be minimal as there is already several existing crossings (culverts), the culvert extension will be appropriately sized, and it is not likely that the extension will act as a barrier to fish migration. No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
Physico-Chemical status																												
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor locally, with no degradation of the element status anticipated at the scale of the water body.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor locally, with no degradation of the element status anticipated at the scale of the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor locally, with no degradation of the element status anticipated at the scale of the water body.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
	6. pH	High	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	7. Phosphate	Moderate	-		N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
	8. Ammonia	High	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	9. Temperature	-	-		N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
Hydromorphological status																												
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • The unnamed drain to Padbury Brook is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	N/A	N/A	N/A	- Is assumed that that a small realignment will divert the channel around the Cowley embankment and stockpile. Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics • The unnamed drain is a minor tributary of Padbury Brook, and in practical terms represents a small proportion of the water body • Lengthening the channel may reduce flow rates although the diversion is not far from the existing channel course • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of lengthening the watercourse still needs to be flagged as a risk	N/A	- Is assumed that that a small realignment will divert the channel around the Cowley embankment and stockpile. Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics • The unnamed watercourse is a minor tributary of Padbury Brook, and in practical terms represents a small proportion of the water body • Lengthening the channel may reduce flow rates although the diversion is not far from the existing channel course • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of lengthening the watercourse still needs to be flagged as a risk	N/A	N/A	N/A	• The watercourse will be realigned to avoid footings in the watercourse • If not realigned, footings may narrow the channel and cause local increases in flow velocity and turbulence • Resultant scour at peak flows could create dead zones at low flows • Minor structure impacts on the channel would promote some hydraulic habitat diversity • Overall, flow constraints would be detrimental to hydromorphology	N/A	N/A	N/A	N/A	• This diversion will be a small realignment of Padbury Brook to avoid viaduct footing in the watercourse • There is likely to be significant diversity of flow dynamics • Lengthening the channel may reduce flow rates (velocity and turbulence / mixing / flow aeration) • The decreased flow rate could cause flows to back up upstream • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of lengthening the watercourse still needs to be flagged as a risk	N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. The unnamed drain to Padbury Brook is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	• Not significant to hydromorphology	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A
	13. River continuity	-	-		N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in wider body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A	N/A	• Lengthening the channel may result in increased channel storage and reduced floodplain connectivity, but the size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected	• The extent of new watercourse that would be created, and the possible, negative effects of altering existing channel conditions, mean that there would be no significant habitat creation	• Lengthening the channel may result in increased channel storage and reduced floodplain connectivity, but the size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected	• The extent of new watercourse that would be created, and the possible negative effects of altering existing channel conditions, mean that there would be no significant habitat creation	N/A	N/A	N/A	• The watercourse will be realigned to avoid footing in the watercourse • If not realigned, footings in the watercourse would decrease natural continuity by the presence of physical obstacles and locally increased flow velocity and turbulence • Local increases in flow velocity and turbulence would reduce continuity and may be inhibitive to species passage	N/A	N/A	N/A	• Lengthening the channel may result in increased channel storage and reduced floodplain connectivity	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in wider body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A
	14. River depth and width variation	-	-		N/A	N/A	N/A	• Out-of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The size of the channel suggests that there is unlikely to be significant silt or diversity in river depth and width	N/A	N/A	• The diversion would replicate existing channel geometry. Out of channel flow depths may decrease as a result of lengthening the channel, but in practical terms there would be no significant change	N/A	• The diversion would replicate existing channel geometry. Out of channel flow depths may decrease as a result of lengthening the channel, but in practical terms there would be no significant change	N/A	N/A	N/A	• Some localised scour of the bed and banks is likely, although this would promote morphological diversity and contribute to ecological deterioration. • Bank protection may be necessary to protect man-shaped assets, which could necessitate further loss of natural bank habitat and offset the equilibrium of the sediment regime • On balance, the effects cannot be classified as detrimental or beneficial	N/A	N/A	N/A	• The diversion would replicate existing channel geometry. Out of bank inundation may decrease as a result of lengthening the channel, but the extent of channel lengthening relative to the size of the water body means this is unlikely to be significant	N/A	N/A	N/A	• Out-of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The size of the channel suggests that there is unlikely to be significant silt or diversity in river depth and width	N/A
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	N/A	• Lengthening a channel tends to reduce flow rates and increase deposition of sediment • Given the size of the watercourse there would probably be no measurable impact	N/A	• Lengthening a channel tends to reduce flow rates and increase deposition of sediment • Given the size of the watercourse there would probably be no measurable impact	N/A	N/A	N/A	• Some localised bed scour is likely due to local increases in flow velocity, turbulence and vortices, but is unlikely to cause major morphological change • Could promote some local diversity in hydraulic, bed and bank habitats, especially if substrates are deposited as bar formations immediately downstream • On balance, the effect could be beneficial, but could also change habitat conditions beyond the tolerance of local species, so it is not possible to classify effects with confidence	N/A	N/A	N/A	• Lengthening a channel tends to reduce flow rates and out-of-bank flows and can increase deposition of sediment	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	• The culvert would disconnect the channel from the adjacent riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	N/A	• Although channel capacity would increase, there is likely to be no net change to existing bank, riparian and floodplain structure and connectivity with channel	N/A	• Although channel capacity would increase, there is likely to be no net change to existing bank, riparian and floodplain structure and connectivity with channel	N/A	N/A	N/A	• Footings in the riparian zones would cause some loss of and obstruction in riparian zone, but relative to the area of open space this is likely to be insignificant	N/A	N/A	N/A	• Although channel capacity would increase, there is likely to be no net change to existing bank, riparian and floodplain structure and connectivity with channel	N/A	N/A	N/A	• The culvert would disconnect the channel from the adjacent riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	
NONE	-	-	Predicted change to status elements (green = none, amber = possible, red = likely)

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Culvert - on unnamed drain north-east of Godington					Culvert - on unnamed drain near Barton Hartshorn					Culvert - on unnamed watercourse near Barton Hartshorn					Culverts - three culverts on unnamed tributary (drain) of Padbury Brook					Culvert - Culverted tributary (drain) of Padbury Brook				
GB105033038210	Moderate	Good Ecological Potential by 2021	Description of scheme element impact	*New Culvert (SWC-CFA13-10) - approximately 40m of watercourse covered by construction.*					*New Culvert (SWC-CFA13-11) - approximately 30m of watercourse covered by construction.*					*New Culvert (SWC-CFA13-22) - approximately 50m of watercourse covered by construction.*					*Erection of 3 culverts and Channel diversion on Unnamed tributary to Padbury Brook (SWC-CFA14-1, SWC-CFA14-10, SWC-CFA14-11, SWC-CFA14-13). Diversion required and culvert of approx. 40m constructed 30m north of unnamed tributary. Surface water flow diverted to drain from north and south. Additional culvert (66m) constructed underneath new highway at Newton Purcell.*					*Culverted tributary (drain) of Padbury Brook (SWC-CFA14-2, SWC-CFA14-12). The drain flows from the north, near Boundary Farm and enters a culvert under Station House and A421. Design will utilise existing culvert underneath proposed route and highway construction to the east.*				
Padbury Brook (The Twins)			Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
WFD classification elements	1.Macrophytes and phytobenthos diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	-	-		Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Localised changes in flow dynamics may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Baseline data indicated very low macrophyte cover, therefore only minor and localised effects are anticipated.	- Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Localised changes in flow dynamics may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). - Baseline data indicated very low macrophyte cover, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Baseline data indicated very low macrophyte cover, therefore only minor and localised effects are anticipated.	- Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Localised changes in flow dynamics may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). - Baseline data indicated very low macrophyte cover, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	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Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Localised changes in flow dynamics may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
	3. Macroinvertebrates	Good	-		Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrate habitats within the culvert. - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Macroinvertebrate community may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor. - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Localised changes in flow dynamics may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrate habitats within the culvert. - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- As baseline data indicated very low macrophyte cover, and loss of macrophytes due to shading will have no effects or negligible effects on macroinvertebrates.	- Localised changes in flow dynamics may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrate habitats within the culvert. - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- As baseline data indicated very low macrophyte cover, and loss of macrophytes due to shading will have no effects or negligible effects on macroinvertebrates.	- Localised changes in flow dynamics may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). - Baseline data indicated very low macrophyte cover, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrate habitats within the culvert. - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Macroinvertebrate community may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor. - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Localised changes in flow dynamics may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrate habitats within the culvert. - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Macroinvertebrate community may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor. - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Localised changes in flow dynamics may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
	4. Fish	High	-		- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Landtake will reduce the availability of fish habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Fish in tributary poor, only minor species present. - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Shading will only have negligible or no effects on fish.	- Fish in tributary poor, only minor species present. - Localised changes in flow dynamics likely to be minimal as there is already several existing crossings (culverts), the culvert extension will be appropriately sized, and it is not likely that the extension will act as a barrier to fish migration. - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - Baseline data indicated moderate fish habitat, but only a few minor species were recorded. The drain is not likely to support migratory fish and the culvert would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Landtake will reduce the availability of fish habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Fish in tributary poor, only minor species present - Baseline data indicated moderate fish habitat, but only a few minor species were recorded. The drain is not likely to support migratory fish and the culvert would not affect the wider water body, therefore only minor and localised effects are anticipated.	Shading will only have negligible or no effects on fish.	- Fish in tributary poor, only minor species present. - Localised changes in flow dynamics likely to be minimal as there is already several existing crossings (culverts), the culvert extension will be appropriately sized, and it is not likely that the extension will act as a barrier to fish migration. - Baseline data indicated moderate fish habitat, but only a few minor species were recorded. The drain is not likely to support migratory fish and the culvert would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Landtake will reduce the availability of fish habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Fish in tributary poor, only minor species present - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Shading will only have negligible or no effects on fish.	- Fish in tributary poor, only minor species present. - Localised changes in flow dynamics likely to be minimal as there is already several existing crossings (culverts), the culvert extension will be appropriately sized, and it is not likely that the extension will act as a barrier to fish migration. - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Landtake will reduce the availability of fish habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Fish in tributary poor, only minor species present - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Shading will only have negligible or no effects on fish.	- Fish in tributary poor, only minor species present. - Localised changes in flow dynamics likely to be minimal as there is already several existing crossings (culverts), the culvert extension will be appropriately sized, and it is not likely that the extension will act as a barrier to fish migration. - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
Physico-Chemical status																													
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Due to the length of the culverts, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
	6. pH	High	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	7. Phosphate	Moderate	-		N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	8. Ammonia	High	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	9. Temperature	-	-		N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culverts, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culverts, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
Hydromorphological status																													
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• Culvert on small unnamed drain which is a tributary to Padbury Brook. • The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • The unnamed drain north-east of Godington is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	N/A	N/A	N/A	• Small watercourse unidentifiable from watershed photography. • The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • Unnamed drain near Barton Hartshorn is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	N/A	N/A	N/A	• Small watercourse unidentifiable from watershed photography. • The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • Unnamed drain near Barton Hartshorn is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	N/A	N/A	N/A	• Culvert on drains on the upper reaches of a tributary to Padbury Brook • The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • The tributary drain of Padbury Brook is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	N/A	N/A	N/A	• Culvert on drains on the upper reaches of a tributary to Padbury Brook • The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • The tributary drain of Padbury Brook is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A
	13. River continuity	-	-		N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in wider body terms, this is a minor feature and the culvert would not affect the deterioration of the overall water body status	N/A	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in wider body terms, this is a minor feature and the culvert would not affect the deterioration of the overall water body status	N/A	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in wider body terms, this is a minor feature and the culvert would not affect the deterioration of the overall water body status	N/A	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in wider body terms, this is a minor feature and the culvert would not affect the deterioration of the overall water body status	N/A
	14. River depth and width variation	-	-		N/A	N/A	N/A	• Out-of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A	N/A	N/A	N/A	• Out-of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A	N/A	N/A	N/A	• Out-of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A	N/A	N/A	N/A	• Out-of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or vegetation diversity • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or vegetation diversity • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or vegetation diversity • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or vegetation diversity • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any connectivity for species moving along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any connectivity for species moving along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any connectivity for species moving along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any connectivity for species moving along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	Predicted change to status elements (green = none, amber = possibly, red = likely)																										
NONE	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	River Diversion - Unnamed tributary (drain) of Padbury Brook.			River Diversion - Culverted tributary (drain) of Padbury Brook.			Cutting (Chetwode Cutting, Twyford Cutting and Calvert Cutting)		Cutting (Barton to Mixbury)		Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB105033038210	Moderate	Good Ecological Potential by 2021	Description of scheme element impact	*River diversion during extension of existing culvert on Culverted tributary (drain) of Padbury Brook (SWC-CFA14-2, SWC-CFA14-12).*			*Surface water will be diverted on unnamed tributary (drain) of Padbury Brook (SWC-CFA14-1, SWC-CFA14-10, SWC-CFA14-11, SWC-CFA14-13). Surface water diverted into drain from both north and south, the drain will also be diverted near Station House and then further south, parallel to the route.*			*No impact on contributions to SW from deep groundwater as nearby cuttings (Chetwode Cutting, Twyford Cutting and Calvert Cutting) on unproductive strata. Potential localised reduction in contribution from shallow groundwater in superficial deposits.*		*Potential influence of groundwater contribution from Barton to Mixbury Cutting to SW tributaries near Newton Purcell as located on Upper Bedford Ouse Oolite Secondary aquifer. Potential localised reduction in contribution from shallow groundwater in superficial deposits.*				Construction	Operation		
Padbury Brook (The Twins)			Identified biological impacts	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.					
1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
2. Macrophytes and phytobenthos - macrophytes	-	-		There will be loss of marginal and channel macrophytes over the length of the existing drain that lies within the diverted section. - No baseline data are available, but the macrophyte community will re-establish within 1 to 3 years of completion of the diversion. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised and only affect the minor drain.	- The new channel will replicate existing habitat and where possible incorporate marginal berms to be established within the channel and the channel will include a range of habitats suitable for colonisation by submerged species. - The effect on this quality element is considered to be minor positive.	- Minor hydromorphological effects anticipated with no likely effect on macrophyte communities of small drain.	-There will be loss of marginal and channel macrophytes over the length of the existing drain that lies within the diverted section. - No baseline data are available, but the macrophyte community will re-establish within 1 to 2 years of completion of the diversion. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised and only affect the minor drain.	- The new channel will replicate existing habitat and where possible incorporate marginal berms to be established within the channel and the channel will include a range of habitats suitable for colonisation by submerged species. - The effect on this quality element is considered to be minor positive.	- Minor hydromorphological effects anticipated with no likely effect on macrophyte communities of small drain.	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	Possible minor reduction in flow with no significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	Only minor and localised changes anticipated.	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.	- Padbury Brook does not currently have a WFD status for macrophytes, is not known to be monitored for this element, although baseline data collected on this watercourse indicated the presence abundant macrophyte communities. - Although the scheme will lead to a loss of habitat and photosynthetic activity (in shaded areas) due to culverting and viaducts, this is mostly on minor tributaries and drains (most of which are heavily shaded, heavily modified and already crossed by roads and railways) rather than on Padbury Brook itself. - All of the effects identified are minor and localised when considered individually. - Taking into account embedded mitigation (such as the inclusion of habitat creation upstream and downstream of culverts), which will help to offset negative effects from culverts and diversions. However, taking into account the number of scheme elements and the sensitivity of the receptor there remains a risk that there could be a deterioration for this element.	N/A	impacts on Padbury Brook and its tributaries will be mitigated by constructing temporary diversions in advance (identified in the EIA as 'additional mitigation')	None required.	Only minor and localised effects are anticipated, which will not affect the status of this WFD element.	
3. Macroinvertebrates	Good	-		There will be temporary loss of macroinvertebrates and habitat over the length of the existing drain that lies within the diverted section. - No baseline data are available, but this minor ditch, but it will only be require less than 1 year to re-establish give the short distance affected. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised and only affect the minor drain.	- The diversion will replicate existing habitat and where possible will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach.	- Minor hydromorphological effects anticipated with no likely effect on macroinvertebrate communities of small drain.	There will be temporary loss of macroinvertebrates and habitat over the length of the existing drain that lies within the diverted section. - No baseline data are available, but this minor ditch, but it will only be require less than 1 year to re-establish give the short distance affected. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised and only affect the minor drain.	- The diversion will replicate existing habitat and where possible be designed to include a range of habitats that are suitable for the fish species present The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities.	- Minor hydromorphological effects anticipated with no likely effect on macroinvertebrate communities of small drain.	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	Possible minor reduction in flow with no significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	Only minor and localised changes anticipated.	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.	- Padbury Brook is currently of 'Good' WFD status for macroinvertebrates, which supported by the baseline data collected on the main Padbury Brook watercourse. - Although the scheme will lead to a loss and photosynthetic activity (in shaded areas) due to extensive culverting, this is mostly on minor tributaries and drains rather (most of which are heavily shaded, heavily modified and already crossed by roads and railways) than on Padbury Brook itself. - All of the effects identified are minor and localised when considered individually. - Embedded mitigation (such as the inclusion of habitat creation upstream and downstream of culverts), will help to offset negative effects from culverts and diversions. However, taking into account the number of scheme elements and the sensitivity of the receptor there remains a risk that there could be a deterioration for this element.	- impacts on Padbury Brook and its tributaries will be mitigated by constructing temporary diversions in advance (identified in the EIA as 'additional mitigation')	None required.	Risk of deterioration remains until detailed design and construction programming are complete.	
4. Fish	High	-		There will be temporary loss of habitat over the length of the existing drain that lies within the diverted section. No baseline data are available, but given that this is a minor drain, only minor species will be present. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised and only affect the minor drain.	- The diversion will replicate existing habitat and where possible be designed to include a range of habitats that are suitable for the fish species present The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities.	- Minor hydromorphological effects anticipated with no likely effect on fish communities of small drain.	There will be temporary loss of habitat over the length of the existing drain that lies within the diverted section. No baseline data are available, but given that this is a minor drain, only minor species will be present. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised and only affect the minor drain.	- The diversion will replicate existing habitat and where possible be designed to include a range of habitats that are suitable for the fish species present The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities.	- Minor hydromorphological effects anticipated with no likely effect on fish communities of small drain.	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	Possible minor reduction in flow with no significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	Only minor and localised changes anticipated.	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.	- Padbury Brook is currently of 'High' WFD status for fish, which supported by the baseline data collected on the main Padbury Brook watercourse, but not on the tributaries. - Important fish populations, including migratory brown trout, are recorded downstream on the Greater Ouse watercourse, which may use this tributary for spawning. - A precautionary approach has been adopted and it is considered that there would be a potential deterioration of this WFD element associated with the culverts on Padbury Brook (but not the minor drains, which do not appear to be suitable for fish). - Embedded mitigation measures (i.e. habitat creation immediately upstream and downstream of culverts) may not be sufficient in negating adverse effects to fish migration or loss of habitat.	- impacts on Padbury Brook and its tributaries will be mitigated by constructing temporary diversions in advance (identified in the EIA as 'additional mitigation') - An assessment of flows and fish passage within culverts must be assessed to inform detailed design of culverts and stream re-alignments. The detailed design of the culverts with respect to fish passage and other measures (such as monitoring) will be agreed with the Environment Agency.		Risk of deterioration remains until detailed design and construction programming are complete.	
Physico-Chemical status																			
5. Dissolved Oxygen	High	-		N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor locally, with no degradation of the element status anticipated at the scale of the water body.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor locally, with no degradation of the element status anticipated at the scale of the water body.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	• Water quality could be reduced in the depleted reaches due to reduced inflow of water and reduced flow rates, turbulence and oxygenation.	Only minor and localised changes anticipated.	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.	Potential minor and localised effects on element.	Monitoring will be required to confirm that the effectiveness of the identified CoCP measures are adequate and that no further measures are required to control the temporary impact of sediment mobilisation	No additional mitigation required	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. Any residual impacts on watercourses and their impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and pollution interceptors are required, the following standard design calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	
6. pH	High	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.	Receptor is insensitive to impact				
7. Phosphate	Moderate	-		N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to the Emscote and the water body. Therefore, no change in status is anticipated.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to Emscote and the water body. Therefore, no change in status is anticipated.	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	Only minor and localised changes anticipated.	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.	Depending on how much flow is lost, potential minor and localised effects on element.				
8. Ammonia	High	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Only minor and localised changes anticipated.	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.	Potential minor and localised effects on element.				
9. Temperature	-	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.	Receptor is insensitive to impact				
10. Specific Pollutants (Annex VIII)	High	-		N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Only minor and localised changes anticipated.	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.	Potential minor and localised effects on element.				
Hydromorphological status																			**Hydromorphology**
11. Quantity and dynamics of river flow	-	-		N/A	• The extent of new watercourse that would be created, and the possible negative effects of altering existing channel conditions, mean that there would be no significant habitat creation	• Minor diversion of watercourse (lengthening) during extension of existing culvert • Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics • The unnamed tributary of Padbury Brook is in practical terms a drainage ditch and represents a small proportion of the water body • Lengthening the channel may reduce flow rates although the diversion is not far from the existing channel course • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of lengthening the watercourse still needs to be flagged as a risk	N/A	• The extent of new watercourse that would be created, and the possible negative effects of altering existing channel conditions, mean that there would be no significant habitat creation	• Diversion of small drains (lengthening) assumed to divert watercourse around culling. • Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics • The unnamed tributary of Padbury Brook is in practical terms a drainage ditch and represents a small proportion of the water body • Lengthening the channel may reduce flow rates although the diversion is not far from the existing channel course • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of lengthening the watercourse still needs to be flagged as a risk	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	N/A	• Reduction of flows in this tributary could cause a localised reduction in flow volumes, depths and dynamics, and consequent reductions in sediment transport (and increased sediment deposition) and reduced net-of-channel habitat connectivity. The effect could be significant for the tributary, but it is not expected as soon as the tributary connects to the larger downstream watercourse so there would not be severe effects at water body scale	N/A	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.	• Watercourse flagged as potential to have cumulative adverse effect on WFD elements due to diversion of main WFD watercourse and extensive culverting of tributaries to Padbury Brook. • Diversion of main WFD watercourse has potential to impact diversity of flow dynamics. The lengthening of the channel may reduce flow rates (velocity and turbulence / mixing / flow aeration) • Majority of the culverts and associated river diversions are on small tributaries to Padbury Brook and are likely to have local impacts on the diversity of flow dynamics. The scheme elements are extensive and therefore in combination may have potential to pose adverse effects on hydromorphological elements	Undertake hydromorphological surveys to aid detailed design Incorporate hydromorphological measures into detailed design where practicable. Mitigation measures may include: • Bank reprofiling (reinstatement) • Introduce in-stream features • Creation of shallow margin in front of hard defence • Install silt, sand or gravel traps • Introduce riparian vegetation/green corridors where space allows • Recreate a sinuous river channel (re-meandering) where space allows • Recreation of gravel bars and riffles using permanent and/or temporary bed structures (increase morphological diversity) • Creation of shallow margin in front of hard defence • Retain marginal vegetation • Use of engineering techniques to assist natural recovery • Use soft engineering techniques	Risk of deterioration remains until detailed design and construction programming are complete.	• hydromorphology baseline data is derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
12. Connection to Groundwater	-	-		N/A		• Likely to be no significant relationship between hydromorphology and groundwater	N/A		• Likely to be no significant relationship between hydromorphology and groundwater	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	N/A		N/A	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.					
13. River continuity	-	-		N/A		• Lengthening the channel may result in increased channel storage and reduced floodplain connectivity, but the size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected	N/A		• Lengthening the channel may result in increased channel storage and reduced floodplain connectivity, but the size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	N/A		N/A	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.					
14. River depth and width variation bed	-	-		N/A		• The diversion would replicate existing channel geometry. Out of channel flow depths may decrease as a result of lengthening the channel, but in practical terms there would be no significant change	N/A		• The diversion would replicate existing channel geometry. Out of channel flow depths may decrease as a result of lengthening the channel, but in practical terms there would be no significant change	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	N/A		N/A	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.					
15. Structure and substrate of river bed	-	-		N/A		• Lengthening a channel tends to reduce flow rates and increase deposition of sediment • Given the size of the watercourse there would probably be no measurable impact	N/A		• Lengthening a channel tends to reduce flow rates and increase deposition of sediment • Given the size of the watercourse there would probably be no measurable impact	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	N/A		N/A	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.					
16. Structure of riparian zone	-	-		N/A		• Although channel capacity would increase, there is likely to be no net change to existing bank, riparian and floodplain structure and connectivity with channel	N/A		• Although channel capacity would increase, there is likely to be no net change to existing bank, riparian and floodplain structure and connectivity with channel	No significant change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	N/A		N/A	Upstream watercourse: Twin. No significant effects anticipated provided mitigation measures are implemented.					

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	When RBMP measure will happen	When RBMP measure will happen																	
NONE	-	-	Predicted change to status elements (green = none, amber = possible, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Westbury Viaduct (footings in or within riparian zone of watercourse)					Culvert under Mixbury Embankment					Turweston Cutting		Mixbury Cutting		Barton to Mixbury Cutting		Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
	GB105033037860	Moderate	Good Ecological Potential by 2027	Description of scheme element impact	Westbury Viaduct crossing River Great Ouse (SWC-CFA14-4). Installation of 7 pier footings, two of which constructed either side of channel (approximately 15-20m away)					Mixbury Culvert under Mixbury Embankment (SWC-CFA14-3) on Mixbury Brook which is a tributary of the R Ouse. Construction of new culvert under Mixbury Embankment with 2.1m internal diameter (and extension to existing culvert with 2.1m internal diameter. 40m long culvert.					Potential loss of groundwater contribution to Ouse and tributaries. Consider Groundwater Assessment and Gw/SW interaction		Potential loss of groundwater contribution to Ouse and tributaries. Consider Groundwater Assessment and Gw/SW interaction		Potential loss of groundwater contribution to Ouse and tributaries. Consider Groundwater Assessment and Gw/SW interaction					
	Ouse			Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due	Change in water quality due to discharge of groundwater to a surface water body.	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due	Change in water quality due to discharge of groundwater to a surface water body.	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due	Change in water quality due to discharge of groundwater to a surface water body.			Construction	Operation		
WFD classification elements	1.Macrophytes and phytobenthos - diatoms			Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	2. Macrophytes and phytobenthos - macrophytes	-	-		Receptor is insensitive to impact	- Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats. No effect anticipated.	- Baseline data indicated that there is only limited macrophyte cover in the area (channel shaded) -There may be minor changes in the cover and composition of macrophyte communities but this is not considered to be greater than a minor localised change.	- No likely effects anticipated.	- CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitat within the culvert. -No baseline data available for this tributary, but as this is a short culvert and a minor tributary only minor and localised effects are anticipated.	- Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - No baseline data available, but as this is a short culvert on a minor tributary only minor and localised effects are anticipated.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the extended culvert) may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Possible effects on dry weather flow in minor tributary, not affecting the River Ouse itself, with possible minor and localised effects, not affecting the WFD status of the element.	No significant change to water quality likely. No effects anticipated	No change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to water quality likely. No effects anticipated	• Possible effects on dry weather flow in tributary. This would not affect the River Ouse itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	No significant change to water quality likely. No effects anticipated	-Upstream water body identified were Great River Ouse (upstream sections) and Radstone Brook -Provided mitigation measures are implemented there will be no effect on the Great River Ouse	- The Great River Ouse does not currently have a WFD status for macrophytes, is not known to be monitored for this element -Although the culvert under the Mixbury Embankment scheme (SWC-CFA14-3) will lead to a loss of bank habitat and macrophyte cover (in shaded areas), this is relatively localised and only affects a minor tributary . - It is anticipated that there would only be minor and localised adverse effects, with no change to the current and future status of this element for the water body as a whole.	None required.	None required.	Minor and localised effects	
	3. Macroinvertebrates	High	-		Receptor is insensitive to impact	- Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats which may be important for macroinvertebrates. No effect anticipated. -Effects considered to be negligible to minor.	- Macroinvertebrate community only minimally affected due to shading effects on macrophyte communities (as macrophyte cover is low and therefore does not constitute a significant enough habitat component for macrophytes). -Effects considered to be negligible to minor.	- No likely effects anticipated.	- CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- Receptor is insensitive to impact	- Landtake will reduce the availability of macroinvertebrate habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids), although suspended solids as culvert is recalled), but these will be mitigated by the CoCP and other best practice measures set out in the ES - No baseline data available, but only a short distance of a minor tributary will be impacted therefore only minor, short term and localised effects are anticipated.	- Loss of macrophytes may lead to indirect effects on macroinvertebrates, due to loss of habitat. - No baseline data available, but only a short distance of a minor tributary will be impacted therefore only minor, short term and localised effects are anticipated.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the extended culvert) may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably immediately downstream). - This would only be affect a limited distance of the watercourse and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Possible effects on dry weather flow in minor tributary, not affecting the River Ouse itself, with possible minor and localised effects, not affecting the WFD status of the element.	No significant change to water quality likely. No effects anticipated	No change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to water quality likely. No effects anticipated	• Possible effects on dry weather flow in tributary. This would not affect the River Ouse itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	No significant change to water quality likely. No effects anticipated	-Upstream water body identified were Great River Ouse (upstream sections) and Radstone Brook -Provided mitigation measures are implemented there will be no effect on the Great River Ouse	- The Great River Ouse is currently of 'Good' overall status for macroinvertebrates. -Although the culvert under the Mixbury Embankment scheme (SWC-CFA14-3) will lead to a loss of bank habitat and macrophyte cover (in shaded areas), with some effects on macroinvertebrates this is relatively localised and only affects a minor tributary. - It is anticipated that there would only be minor and localised/temporary adverse effects, with no change to the current and future status of this element for the water body as a whole.	None required.	None required.	Minor and localised effects	
	4. Fish	High	-		- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - Effects are likely to be temporary and localised. - Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats which may be important for fish.	Fish community only minimally affected due to shading effects on macrophyte communities (as macrophyte cover is low and therefore does not constitute a significant enough habitat component for macrophytes). -Effects considered to be negligible to minor.	- No likely effects anticipated.	- CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - Effects are likely to be temporary and localised	- Landtake will reduce the availability of macroinvertebrate habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - No baseline data available, but this is a tributary of a salmonid river. - However, this a short culvert near to the headwater of a minor tributary which is crossed by roads and other tracks, with limited connectivity to locations, so is already culverted. Therefore, only minor, short term and localised effects are anticipated	Shading will only have negligible or no effects on fish.	- No baseline data available, but this is a short culvert on a minor tributary which may not be tributary for spawning or refuge which have the to be impacted by changes in flow. - Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel) likely to be minimal as there is already several existing crossings (culverts), the culvert extension will not be appropriately sized, and it is not likely that the culvert will act as a barrier to fish migration. - No significant effects are therefore anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Possible effects on dry weather flow in minor tributary (not likely to contribute significantly to the fish element of the water body), not affecting the River Ouse itself and not affecting the WFD status of the element.	No significant change to water quality likely. No effects anticipated	No change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to water quality likely. No effects anticipated	• Possible effects on dry weather flow in tributary. This would not affect the River Ouse itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	No significant change to water quality likely. No effects anticipated	-Upstream water body identified were Great River Ouse (upstream sections) and Radstone Brook -Provided mitigation measures are implemented there will be no effect on the Great River Ouse	- The Great River Ouse is currently of 'High' overall status for fish. - Although the culvert under the Mixbury Embankment scheme (SWC-CFA14-3) will lead to a loss of bank habitat and macrophyte cover (in shaded areas), with some effects on fish habitat this is relatively localised and only affects a minor tributary. - Taking into account embedded mitigation (such as appropriately sized culverts for fish passage) it is anticipated that there would only be minor and localised/temporary effects, with no change to the current and future status of this element for the water body as a whole.	Monitoring during construction and operation within the main R Ouse	Monitoring during construction and operation within the main R Ouse	Minor and localised effects	
Physico-Chemical status																										
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. The culvert is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	No significant change to water quality likely. No effects anticipated	No change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to water quality likely. No effects anticipated	• Possible effects on dry weather flow in tributary. This would not affect the River Ouse itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	No significant change to water quality likely. No effects anticipated	-Upstream water bodies identified were Great River Ouse (upstream sections) and Radstone Brook -Provided mitigation measures are implemented there will be no effect on the Great River Ouse	Depending on how much flow is lost, potential minor and localised effects on element on minor tributary. It is anticipated that there would only be minor and localised adverse effects, with no change to the current and future status of this element for the water body as a whole.	None required.	None required.	Minor and localised effects	
	6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	-Upstream water bodies identified were Great River Ouse (upstream sections) and Radstone Brook -Provided mitigation measures are implemented there will be no effect on the Great River Ouse	Receptor is insensitive to impact			No significant Effects	
	7. Phosphate	Moderate	-		N/A	N/A	N/A	actively an open span bridge, so there would be	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	No significant change to water quality likely. No effects anticipated	No change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to water quality likely. No effects anticipated	• Possible effects on dry weather flow in tributary. This would not affect the River Ouse itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	No significant change to water quality likely. No effects anticipated	-Upstream water bodies identified were Great River Ouse (upstream sections) and Radstone Brook -Provided mitigation measures are implemented there will be no effect on the Great River Ouse	Depending on how much flow is lost, potential minor and localised effects on element on minor tributary. It is anticipated that there would only be minor and localised adverse effects, with no change to the current and future status of this element for the water body as a whole.			Minor and localised effects	
	8. Ammonia	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	No significant change to water quality likely. No effects anticipated	No change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to water quality likely. No effects anticipated	• Possible effects on dry weather flow in tributary. This would not affect the River Ouse itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	No significant change to water quality likely. No effects anticipated	-Upstream water bodies identified were Great River Ouse (upstream sections) and Radstone Brook -Provided mitigation measures are implemented there will be no effect on the Great River Ouse	Depending on how much flow is lost, potential minor and localised effects on element on minor tributary. It is anticipated that there would only be minor and localised adverse effects, with no change to the current and future status of this element for the water body as a whole.			Minor and localised effects	
	9. Temperature	-	-		N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	-Upstream water bodies identified were Great River Ouse (upstream sections) and Radstone Brook -Provided mitigation measures are implemented there will be no effect on the Great River Ouse	Receptor is insensitive to impact			No significant Effects	
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	No significant change to water quality likely. No effects anticipated	No change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No significant change to water quality likely. No effects anticipated	• Possible effects on dry weather flow in tributary. This would not affect the River Ouse itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	No significant change to water quality likely. No effects anticipated	-Upstream water bodies identified were Great River Ouse (upstream sections) and Radstone Brook -Provided mitigation measures are implemented there will be no effect on the Great River Ouse	Depending on how much flow is lost, potential minor and localised effects on element on minor tributary. It is anticipated that there would only be minor and localised adverse effects, with no change to the current and future status of this element for the water body as a whole.			Minor and localised effects	
Hydromorphological status																										Hydromorphology Baseline
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings. • Overall, there would probably be no hydromorphological impact	N/A	N/A	N/A	N/A	• Channel is not wide enough to observe or measure from maps but widens to 5m or more, so there is unlikely to be significant diversity of flow dynamics • The size of the drainage channel means there is unlikely to be significant diversity of flow dynamics • The Mixbury Culvert is effectively a drainage ditch within the Ouse water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	• Possible effects on dry weather flow in minor tributary. This would not affect the River Ouse itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	N/A	• No likely change to surface water flows are anticipated, and therefore no effects on hydromorphology are anticipated	N/A	• Possible effects on dry weather flow in tributary. This would not affect the River Ouse itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	N/A	-Upstream water body identified were Great River Ouse (upstream sections) and Radstone Brook -Provided mitigation measures are implemented there will be no effect on the Great River Ouse	• No significant impacts for Westbury Viaduct - Culverting the unnamed drainage ditch under the Mixbury embankment would impact a first order tributary / drainage ditch to the River Great Ouse, but in practical terms this would affect a very small proportion of the water body and no measurable effects are likely to be anticipated	None required.	None required.	No significant Effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A			N/A	N/A	N/A	• There are several springs near the water body, so the culvert could affect the relationship between hydromorphology and groundwater	N/A	• Possible effects on dry weather flow in minor tributary. This would not affect the River Ouse itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	N/A		N/A	• Possible effects on dry weather flow in tributary. This would not affect the River Ouse itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	N/A						
	13. River continuity	-	-		N/A	N/A	N/A			N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the A43. • However, in water body terms, this is a minor feature and the culvert would not result in a deterioration of the overall water body status	N/A	• Possible effects on dry weather flow in minor tributary which could result in localised increases in flow depths. This would not affect the River Ouse itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	N/A		N/A	• Possible effects on dry weather flow in minor tributary which could result in localised increases in flow depths. This would not affect the River Ouse itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	N/A						
	14. River depth and width variation bed	-	-		N/A	N/A	N/A			N/A	N/A	N/A	• Out-of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The size of the channel suggests there would not be significant loss of diversity depth and width	N/A	• Possible effects on dry weather flow in minor tributary which could result in localised decreases in flow depths. This would not affect the River Ouse itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	N/A		N/A	• Possible effects on dry weather flow in minor tributary which could result in localised decreases in flow depths. This would not affect the River Ouse itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	N/A						
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A			N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant diversity of flow, transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	• Possible effects on dry weather flow in minor tributary which could result in localised increases in sedimentation. This would not affect the River Ouse itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	N/A		N/A	• Possible effects on dry weather flow in minor tributary which could result in localised increases in sedimentation. This would not affect the River Ouse itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	N/A						
	16. Structure of riparian zone	-	-		N/A	N/A	N/A			N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	• Possible effects on dry weather flow in minor tributary which could result in localised decreases in flow depths and reduced channel - riparian connectivity. This would not affect the River Ouse itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	N/A		N/A	• Possible effects on dry weather flow in minor tributary which could result in localised decreases in flow depths and reduced channel - riparian connectivity. This would not affect the River Ouse itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	N/A						

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen																							
Sediment management strategies (develop and revise)	-	-	Predicted change to status elements (green = none, amber = possible, red = likely)	-	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-	-	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be	-	-	-	-	-	-	-	-	-	No effect anticipated.	No additional measures required	No additional measures required	No significant Effects	
Retain marginal aquatic and riparian habitats (channel alteration)	-	-		-	-	-		-	-	-	Some minor and localised loss of marginal and riparian vegetation. This will NOT be mitigated by improvements to habitat upstream and downstream of culvert (embedded mitigation) due to lack of available land.	Some minor and localised loss of marginal and riparian vegetation. This will NOT be mitigated by improvements to habitat upstream and downstream of culvert (embedded mitigation) due to lack of available land.	• Measures are likely to become more difficult to implement at the crossing location • Development opportunity should be used to implement measures elsewhere. If this takes place future status will not be inhibited and it will help objectives to be achieved	-	-	-	-	-	-	-	-	-	Some minor and localised loss of marginal and riparian vegetation on Mixbury Brook, tributary of R Ouse. However, this is considered to represent a minor adverse impact on the implementation of this objective for the water body as a whole.	No additional measures required	No additional measures required	Minor and localised effects	
Appropriate techniques (invasive species)	-	-		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated. Appropriate controls on invasive species will be implemented.	No additional measures required	No additional measures required	No significant Effects	
Appropriate timing (vegetation control)	-	-		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	No additional measures required	No additional measures required	No significant Effects	
Appropriate vegetation control technique	-	-		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	No additional measures required	No additional measures required	No significant Effects	
Selective vegetation control regime	-	-		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	No additional measures required	No additional measures required	No significant Effects	-
Appropriate channel maintenance strategies and techniques - minimise disturbance to channel bed and margins.	-	-		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Locative disturbance of channel bed and margins during construction of the Mixbury culvert and therefore measure cannot be implemented at this location.	No additional measures required	No additional measures required	Minor and localised effects	
Operational and structural changes, to locks, sluices, weirs, beach control, etc.	-	-		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	No additional measures required	No additional measures required	No significant Effects	
Structures or other mechanisms in place and managed to enable fish to access waters upstream and downstream of the impounding works.	-	-		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	No additional measures required	No additional measures required	No significant Effects	
Improve floodplain connectivity	-	-		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Measures are likely to become more difficult to implement at the crossing location. Development opportunity should be used to implement measures elsewhere. If this takes place future status will not be inhibited and it will help objectives to be achieved	No additional measures required	No additional measures required	Minor and localised effects	
Set-back embankments	-	-		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	No additional measures required	No additional measures required	No significant Effects	
Increase in-channel morphological diversity	-	-		-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Measures are likely to become more difficult to implement at the crossing location. Development opportunity should be used to implement measures elsewhere. If this takes place future status will not be inhibited and it will help objectives to be achieved	No additional measures required	No additional measures required	Minor and localised effects	

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Turweston Viaduct (footings in or within riparian zone of watercourse)					River Diversion - Channel diversion at Turweston Viaduct			Culvert extension on Unnamed tributary of River Great Ouse near Hall Farm				
	GB105033037880	Good	Good Ecological Status by 2015	Description of scheme element impact	*Construction of pier footings and balancing ponds at SWC-CFA14-5 and SWC-CFA14-6. Viaduct 80m in length.*					*Channel diversion associated with construction of pier footings in riparian area (SWC-CFA14-5 and SWC-CFA14-6).*			*Extension of culvert on tributary to River Great Ouse at SWC-CFA14-15. New Rood realignment and overbridge meaning extension of existing culvert.*				
	Ouse			Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	-	-		- Receptor is insensitive to impact	- Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats.	- No baseline data were available for this section, but marginal and channel macrophytes are recorded in other sections of the Great River Ouse. - There may be minor changes in the cover and composition of macrophyte communities, but this is not considered to be greater than a minor localised change.	- No likely effects anticipated.	- CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	-There will be temporary loss of marginal and channel macrophytes over the 150 m length of the existing channel that lies within the diverted section. - No baseline data were available for this section, but marginal and channel macrophytes are recorded in other sections of the Great River Ouse - It is anticipated that the macrophyte community will re-establish within 1 to 2 years of completion of the river diversion.	- The new channel will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. -The effect on this quality element is considered to be minor positive.	No hydromorphological effects anticipated and therefore no effect on macrophyte communities	- Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. - No baseline data available, but as there is an existing culvert that will only be extended on a minor tributary, only minor and localised effects are anticipated	- Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - As there is already an existing culvert that will be extended, effects will be minimal	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the extended culvert) may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
	3. Macroinvertebrates	Good	-		- Receptor is insensitive to impact	- Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats which may be important for macroinvertebrates.	- Macroinvertebrate community may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor.	- No likely effects anticipated.	- CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	-There will be temporary loss of invertebrate habitat over the 150 m length of the existing channel that lies within the diverted section. - Baseline data from the river show that the invertebrate community is diverse, and pollution sensitive groups are present. - Effects will be localised and it is anticipated that the community will re-establish within 1 to 2 years of completion of the river diversion.	- The river diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach.	No hydromorphological effects anticipated and therefore no effect on macroinvertebrate communities	- Receptor is insensitive to impact	- Landtake will reduce the availability of macroinvertebrate habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids). - No baseline data available, but as there is an existing culvert that will only be extended on a minor tributary, only minor, short term and localised effects are anticipated	- Loss of macrophytes may lead to indirect effects on macroinvertebrates, due to loss of habitat No baseline data available, but it is anticipated that this will have a localised impact, not affecting the WFD status for this element	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the extended culvert) may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably immediately downstream). - This would only be affect a limited distance of the watercourse and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
	4. Fish	High	-		- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). - Baseline data show good fish habitat and diverse species diversity, including salmonids. - However, effects are likely to be temporary and localised.	- Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats which may be important for fish.	Shading will only have negligible or no effects on fish.	- No likely effects anticipated.	- CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	-There will be temporary loss of fish and fish habitat quality over the 150 m length of the existing channel that lies within the diverted section. - Baseline data show good fish habitat and diverse species diversity, including salmonids. - It is anticipated that the community will re-establish within 1 to 2 years of completion of the river diversion.	- The river diversion will be designed to include a range of habitats that are suitable for the fish species present The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities.	- No hydromorphological effects anticipated and therefore no effect on fish communities	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - Effects are likely to be temporary and localised	- Landtake will reduce the availability of fish habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids). - No baseline data available, but this is a tributary of a salmonid river - as there is an existing culvert that will only be extended on a minor tributary, only minor, short term and localised effects are anticipated	Shading will only have negligible or no effects on fish.	- No baseline data available, but this is a tributary of a salmonid river, which may use the tributary for spawning or refuge which have the to be impacted by changes in flow. - Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel) likely to be minimal as there is already an existing culvert, the culvert extension will be appropriately sized, and it is not likely that the extension will act as a barrier to fish migration	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
	Physico-Chemical status																
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
	6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	7. Phosphate	Good	-		N/A	N/A	N/A	ively an open span bridge, so there would be	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact
	8. Ammonia	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	9. Temperature	-	-		N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
	Hydromorphological status																
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	N/A	N/A	• The extent of the diversion is likely to mean that any effects on flow dynamics would be very localised and are unlikely to be significant	N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • The unnamed tributary is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A
	12. Connection to Groundwater	-	-		N/A	N/A	N/A		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A
	13. River continuity	-	-		N/A	N/A	N/A		N/A	N/A	N/A	• The extent of the diversion is likely to mean that there would be no significant effects on continuity	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel, • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A
	14. River depth and width variation bed	-	-		N/A	N/A	N/A		N/A	N/A	N/A	• The diversion would replicate existing channel geometry	N/A	N/A	N/A	• Out-of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A		N/A	N/A	N/A	• Some minor and localised effects on scour and substrate deposition could occur, but these are unlikely to be significant and would promote morphological diversity rather than have any detrimental affects	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A
	16. Structure of riparian zone	-	-		N/A	N/A	N/A		N/A	N/A	N/A	• Pier footings would have localised impact on riparian zones, but these are unlikely to have significant negative effects • Bank protection may be required to maintain the new river course and prevent lateral scouring against the piers, but the extent of bank engineering is unlikely to be significant at water body scale	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen														
NONE	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Brackley South Cutting		Turweston Cutting		Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
										Construction	Operation		
GB105033037880	Good	Good Ecological Status by 2015	Description of scheme element impact	*Cutting within catchment of Ouse GB105033037880. No springs within RoI. Cutting gradient means drainage will be primarily to the south. Potential for reduction in spring flows to a major tributary of Ouse to SW of cutting. Tributary affected but not Ouse itself as discharge point is upstream in catchment.*		*Ouse and tributaries in vicinity of Turweston Cutting - consideration of SW/GW interaction.*							
Ouse			Identified biological impacts	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due	Change in water quality due to discharge of groundwater to a surface water body.	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due	Change in water quality due to discharge of groundwater to a surface water body.						
WFD classification elements	**1.Macrophytes and phytobenthos - diatoms**	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	-	-	- Potential permanent reduction on flow over 2/3 km of a major tributary of the Great Ouse, not affecting the Ouse itself - No baseline data available on the tributary and this element does not currently have a status class. - The main watercourse would not be affected and therefore it is considered that this scheme element would have localised effects and does not have has the potential to affect this scheme element.	No change to surface water quality identified in groundwater assessment, no effects on this WFD element anticipated.	No change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	- Only upstream water body identified was Radstone Brook - Provided mitigation measures are implemented there will be no effect on the Great River Ouse	- The Great River Ouse does not currently have a WFD status for macrophytes, is not known to be monitored for this element. - Although the scheme will lead to a loss of habitat and photosynthetic activity (in shaded areas) and loss of flow in a tributary, this is relatively localised. - Taking into account embedded mitigation (such as the inclusion of habitat creation upstream and downstream of culverts and in diverted sections of the river) it is anticipated that there would only be minor and localised adverse effects, with no change to the current and future status of this element.	No additional measures required	No additional measures required	Minor and localised effects	
	3. Macroinvertebrates	Good	-	- Potential permanent reduction on flow over 2/3 km of a major tributary of the Great Ouse, not affecting the Ouse itself - No baseline data available on the tributary but macroinvertebrates are of 'Good' overall status in the Great Ouse. - The main watercourse would not be affected and therefore it is considered that this scheme element would have localised effects and does not have has the potential to affect this scheme element.	No change to surface water quality identified in groundwater assessment, no effects on this WFD element anticipated.	No change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	- Only upstream water body identified was Radstone Brook - Provided mitigation measures are implemented there will be no effect on the Great River Ouse	- The Great River Ouse is currently of 'Good' overall status for macroinvertebrates. - Although the scheme will lead to a loss of habitat in culverts and diverted sections of river, this is relatively localised and/or temporary. - The change in flow due to reduction in groundwater flows (brought about by cuttings) has the potential to affect the macroinvertebrates in a major tributary, but not the main watercourse. - Taking into account embedded mitigation (such as the inclusion of habitat creation upstream and downstream of culverts and in diverted sections of the river) it is anticipated that there would only be minor and localised adverse effects, with no change to the current and future status of this element.	No additional measures required	No additional measures required	Minor and localised effects	
	4. Fish	High	-	- Potential permanent reduction on flow over 2/3 km of a major tributary of the Great Ouse, not affecting the Ouse itself - No baseline data available on the tributary but fish have a 'High' overall status in the Great Ouse and surveys indicate the presence of salmonid fish, which use the tributary for refuge and/or spawning. - Given the length of watercourse affected and the sensitivity of fish in the area, it is considered that the scheme element has the potential to	No change to surface water quality identified in groundwater assessment, no effects on this WFD element anticipated.	No change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	No change to surface water flow identified in groundwater assessment, no effects on this WFD element anticipated	- Only upstream water body identified was Radstone Brook - Provided mitigation measures are implemented there will be no effect on the Great River Ouse	- The Great River Ouse is currently of 'High' overall status for fish. - Although the scheme will lead to a loss of habitat in culverts and diverted sections of river, this is relatively localised and/or temporary. - The change in flow due to reduction in groundwater flows (brought about by cuttings) has the potential to affect the fish in a major tributary. This has the potential to deteriorate the fish element WFD status.	1. Monitoring of fish populations and flow gauging during construction and operation. 2. If flows are found to fall below critical thresholds for fish populations consideration will be given to measures such as altering re charge locations in order to augment flows.		Although mitigation measures to address the potential impacts on flow are being considered, it will not be possible to state with confidence that there will be no deterioration of status at this stage.	
Physico-Chemical status													
WFD classification elements	**5. Dissolved Oxygen**	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	No significant change to water quality likely. No effects anticipated .	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	No significant change to water quality likely. No effects anticipated .	- Only upstream water body identified was Radstone Brook - Provided mitigation measures are implemented there will be no effect on the Great River Ouse	Potential minor and localised effects on element.	No additional measures required	No additional measures required	Minor and localised effects	
	6. pH	High	-		Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	- Only upstream water body identified was Radstone Brook - Provided mitigation measures are implemented there will be no effect on the Great River Ouse	Receptor is insensitive to impact			No significant effects	
	7. Phosphate	Good	-		• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	No significant change to water quality likely. No effects anticipated .	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	No significant change to water quality likely. No effects anticipated .	- Only upstream water body identified was Radstone Brook - Provided mitigation measures are implemented there will be no effect on the Great River Ouse	Depending on how much flow is lost, potential minor and localised effects on element.			Minor and localised effects	
	8. Ammonia	High	-		• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	No significant change to water quality likely. No effects anticipated .	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	No significant change to water quality likely. No effects anticipated .	- Only upstream water body identified was Radstone Brook - Provided mitigation measures are implemented there will be no effect on the Great River Ouse	Potential minor and localised effects on element.			Minor and localised effects	
	9. Temperature	-	-		Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	- Only upstream water body identified was Radstone Brook - Provided mitigation measures are implemented there will be no effect on the Great River Ouse	Receptor is insensitive to impact			No significant effects	
	10. Specific Pollutants (Annex VIII)	High	-		• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	No significant change to water quality likely. No effects anticipated .	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	No significant change to water quality likely. No effects anticipated .	- Only upstream water body identified was Radstone Brook - Provided mitigation measures are implemented there will be no effect on the Great River Ouse	Potential minor and localised effects on element.			Minor and localised effects	
Hydromorphological status													**Hydromorphology Baseline**
WFD classification elements	**11. Quantity and dynamics of river flow**	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	• Reduction of flows in this tributary could cause a localised reduction in flow volumes, depths and dynamics, and consequent reductions in sediment transport (and increased sediment deposition) and reduced out-of-channel habitat connectivity. The effect could be significant for this tributary, but would be buffered as soon as the tributary connects to the larger downstream watercourse so there would not be severe effects at water body scale	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	• Reduction of flows in this tributary could cause a localised reduction in flow volumes, depths and dynamics, and consequent reductions in sediment transport (and increased sediment deposition) and reduced out-of-channel habitat connectivity. The effect could be significant for this tributary, but would be buffered as soon as the tributary connects to the larger downstream watercourse so there would not be severe effects at water body scale	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	- Only upstream water body identified was Radstone Brook - Provided mitigation measures are implemented there will be no effect on the Great River Ouse	• No significant impacts are anticipated for Turweston Viaduct footings or the associated channel diversion, although this may need to be investigated further if bank engineering is required to prevent lateral scour against the viaduct footings • Culvert extension could exacerbate existing deteriorations to ecology, even though the brook is a minor feature	Undertake hydromorphological surveys to aid detailed design Incorporate hydromorphological measures into detailed design where practicable. Mitigation measures may include: • Bank reprofiling (rehabilitation) • Recreate a sinuous river channel (re-meandering) where space allows • Retain marginal vegetation • Use of engineering techniques to assist natural recovery • Use soft engineering techniques		Minor and localised effects	• Hydromorphology baselined derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-						- Only upstream water body identified was Radstone Brook - Provided mitigation measures are implemented there will be no effect on the Great River Ouse					
	13. River continuity	-	-						- Only upstream water body identified was Radstone Brook - Provided mitigation measures are implemented there will be no effect on the Great River Ouse					
	14. River depth and width variation bed	-	-						- Only upstream water body identified was Radstone Brook - Provided mitigation measures are implemented there will be no effect on the Great River Ouse					
	15. Structure and substrate of river bed	-	-						- Only upstream water body identified was Radstone Brook - Provided mitigation measures are implemented there will be no effect on the Great River Ouse					
	16. Structure of riparian zone	-	-						- Only upstream water body identified was Radstone Brook - Provided mitigation measures are implemented there will be no effect on the Great River Ouse					

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen										
NONE	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	No effect on attaining future good status/potential anticipated	None necessary	None necessary	No further change	

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Cutting		Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
	GB105033037950	Moderate	Good Ecological Potential by 2027	Description of scheme element impact	Greatworth South Cutting - moderate change in flows to small tributary							
	Ouse (Beds)			Identified biological impacts	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.			Construction	Operation		
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	Not assessed	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	Not assessed	Not assessed	N/A	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	Not assessed	-		- Possible effects on macrophytes if base flows are reduced - No baseline data available - Effects are likely to be localised to the tributary, not affecting the main watercourse.	No significant effects anticipated as best practice guidance for discharge will be followed.	No upstream watercourses	- Possible localised changes, but no change in status of this element anticipated	None required.	None required.	- Possible localised changes, but no change in status of this element anticipated	-
	3. Macroinvertebrates	Not assessed	-		- Possible loss of flow sensitive groups in minor tributary associated with reduced base flows - Main watercourse not likely to be affected - Although not assessed in the RBMP, the HS2 baseline data indicate the invertebrate community is currently of low diversity, impacted by sedimentation and other water quality issues. - Effects are likely to be localised	No significant effects anticipated as best practice guidance for discharge will be followed.		- Possible localised changes, but no change in status of this element anticipated	None required.	None required.	- Possible localised changes, but no change in status of this element anticipated	-
	4. Fish	Not assessed	-		- Possible effects on fish in tributary associated with reduced base flows - HS2 baseline data from the tributary show that fish habitat is poor to moderate and has a severely limited fish population - Effects on fish therefore minor and localised to the tributary	No significant effects anticipated as best practice guidance for discharge will be followed.		- Possible localised changes, but no change in status of this element anticipated	None required.	None required.	- Possible localised changes, but no change in status of this element anticipated	-
	Physico-Chemical status											
WFD classification elements	5. Dissolved Oxygen	Not assessed	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	No significant effects anticipated as best practice guidance for discharge will be followed.	No upstream watercourses	Potential minor and localised effects on element.	None required.	None required.	Minor and localised effects	-
	6. pH	Not assessed	-		Receptor is insensitive to impact	Receptor is insensitive to impact		Receptor is insensitive to impact			Receptor is insensitive to impact	-
	7. Phosphate	Not assessed	-		• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including ghosphate from source and diffuse pollution.	No significant effects anticipated as best practice guidance for discharge will be followed.		Depending on how much flow is lost, potential minor and localised effects on element.			Minor and localised effects	-
	8. Ammonia	Not assessed	-		• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates.	No significant effects anticipated as best practice guidance for discharge will be followed.		Potential minor and localised effects on element.			Minor and localised effects	-
	9. Temperature	-	-		Receptor is insensitive to impact	Receptor is insensitive to impact		Receptor is insensitive to impact			Receptor is insensitive to impact	-
	10. Specific Pollutants (Annex VIII)	Not assessed	-		• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates.	No significant effects anticipated as best practice guidance for discharge will be followed.		Potential minor and localised effects on element.			Minor and localised effects	-
	Hydromorphological status											**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	• Potential loss to flow from springs into small tributary of Ouse Beds. • Surface drainage from north-eastern side of the cutting will be directed to minor watercourse south-east of Greatworth Fields - but not likely to fully compensate loss of flow. • Unlikely to have significant impact on flow rates due to the size of the tributary in relation to the wider catchment.	N/A	No upstream watercourses	• Potential loss to flows in tributary to Ouse Beds is likely to be small and likely to have no measurable impact on hydromorphology, especially considering that intercepted surface drainage from north-eastern side of the cutting will be discharge to watercourse. • Risks are considered unlikely at this stage, but needs further investigation to rule out risks with confidence	None required.	None required.	Minor and localised effects	• Hydromorphology baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		• Unlikely to be significant relationship between hydromorphology and groundwater	N/A						
	13. River continuity	-	-		• Continuity in tributary may be impacted during periods where groundwater levels are low	N/A						
	14. River depth and width variation bed	-	-		• Potential reduction in river depth due to reduction in contribution from groundwater, however, likely to be small.	N/A						
	15. Structure and substrate of river bed	-	-		• Unlikely to have impact on river bed	N/A						
	16. Structure of riparian zone	-	-		• No change to existing bank, riparian and floodplain structure and connectivity with channel	N/A						

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	-	-	-	-	-	-	-	-	-
Sediment management strategies (develop and revise) In Place	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	No impact on objective	None proposed	None proposed	N/A	N/A
Retain marginal aquatic and riparian habitats (channel alteration) In Place	-	-		N/A	N/A	N/A	No direct impact on objective, but any changes in flow in minor tributary caused by dewatering of the Greatworth South cutting could affect implementation of this objective within this minor tributary.	None proposed	None proposed	Minor and localised effects	N/A
Appropriate techniques (invasive species) In Place	-	-		N/A	N/A	N/A	No impact on objective	None proposed	None proposed	No impact on objective	N/A
Appropriate timing (vegetation control) In Place	-	-		N/A	N/A	N/A	No impact on objective	None proposed	None proposed	No impact on objective	N/A
Appropriate vegetation control technique In Place	-	-		N/A	N/A	N/A	No impact on objective	None proposed	None proposed	No impact on objective	N/A
Selective vegetation control regime In Place	-	-		N/A	N/A	N/A	No impact on objective	None proposed	None proposed	No impact on objective	N/A
Appropriate techniques to align and attenuate flow to limit detrimental effects of these features	-	-		N/A	N/A	N/A	No direct impact on objective, but any changes in flow in minor tributary caused by dewatering of the Greatworth South cutting could affect implementation of this objective within this minor tributary.	None proposed	None proposed	Minor and localised effects	N/A
Increase in-channel morphological diversity Not In Place	-	-		N/A	N/A	N/A	No direct impact on objective, but any changes in flow in minor tributary caused by dewatering of the Greatworth South cutting could affect implementation of this objective within this minor tributary.	None proposed	None proposed	Minor and localised effects	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	River Diversion			Cutting		Culvert						Greatworth Green Tunnel		Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
																			Construction	Operation		
GB105033037940	Moderate	Good Ecological Potential by 2027	Description of scheme element impact	640m diversion of unnamed tributary (drain) of the Radstone Brook SWC-CFA14-8 and 19. 230m length of drain, from source, may be lost to construction.			Brackley north, Brackley South and Greatworth South Cutting : Possible minor changes to base flow of tributaries and Radstone Brook , particularly from Brackley North and Greatworth South Cutting. - Greatworth South Cutting has the potential to affect dry weather flows of approx. 1.5 km of an upstream trib (headwater stream), for which no baseline data are available, but not affecting Radstone Brook as a whole. - Brackley North Cutting will affect dry weather flows on Radstone Brook, and drainage from the cutting will be discharge to the Great Ouse watercourse, not Radstone Brook.			Radstone Brook SWC-CFA14-7, 16, 17 and 18. Four new culverts (including Brackley culvert) carrying Radstone Brook under access roads and Brackley embankment. Total length of culverts 34m + 7m + 36m + 60m. Headwater channel of Radstone Brook SWC-CFA15-9. New culvert (Helmdon culvert) under Greatworth south embankment. Length 30m. Includes a small diversion through culvert.					Temporary effects (loss of flow) during construction of tunnel						
Radstone Brook			Identified biological impacts	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Creation of new habitats	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.						
WFD classification elements	1. Macrophytes and phytobenthos - diatoms	-	-	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	-	-	- There will be loss of marginal and channel macrophytes over the 640 m length of the existing small tributary that lies within the diverted section. -No baseline data are available for the ditch, but given its small size and current lower plantform it is not likely to important for macrophytes within the context of the wider watercourse. - It is considered that the macrophyte community will re-establish within 1 to 2 years of completion of the river diversion within the diverted channel, while macrophytes within approximately 230 m that may be permanently lost to construction will be permanently lost given that this is a minor ditch, only localised effects are anticipated	- The new channel will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. - The effect on this quality element is considered to be minor positive.	No significant hydromorphological effects anticipated	- Impacts have the potential to reduce the macrophyte element by altering dry weather flows to the watercourse. Following a precautionary approach and given limited information on likely change in flow and baseline informations' status of this WFD element, adverse effects on this element are anticipated.	Only minor and localised effects anticipated as a result of changes in water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. No baseline data are available for this section, but effects are likely to be localised	- Shading of the channel from the construction of culverts is likely to reduce the availability of macrophytes within the culvert. - Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert) may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert) may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	N/A	N/A	- Minor and localised effects, no change in WFD class of element.	Minor and localised effects, no change in WFD class of element.	No upstream water bodies	- Radstone Brook does not currently have a WFD status for macrophytes, is not known to be monitored for this element and/or baseline data were collected on this watercourse. - Although the scheme will lead to a loss of habitat and plantsmphemic activity (in shaded areas), this is relatively localised and the habitat enhancements proposed as part of the scheme of habitat creation upstream and downstream of culverts is also anticipated that there would only be minor and localised adverse effects, with no change to the current and future status of this element. - Further assessment of changes to groundwater flows on surface water required.	None required.	No additional mitigation measure required for invertebrates, but mitigation measures proposed for fish (see below) will provide to some further mitigation for this element. - Further assessment of changes to groundwater flows on surface water required.	Minor and localised effects. Further assessment of changes to groundwater flows on surface water required.
	3. Macroinvertebrates	-	-	- There will be loss of invertebrates over the 640 m length of the existing small tributary that lies within the diverted section. -No baseline data are available for the ditch, but given its small size and current lower plantform it is not likely to important for macroinvertebrates within the context of the wider watercourse. - It is anticipated that the macroinvertebrate community will re-establish within 1 to 2 years of completion of the river diversion within the diverted channel, while invertebrates within approximately 230 m that may be permanently lost to construction will be permanently lost given that this is a minor ditch, only localised effects are anticipated	- the diversion will be designed to include a range of channel habitats (where possible given the context of a small ditch), including where possible riffle-pool sequences and habitats suitable for colonisation by the range of invertebrate taxa that currently characterise the reach.	No significant hydromorphological effects anticipated	- Impacts have the potential to reduce the invertebrate element by altering dry weather flows to the watercourse (possible loss of flow sensitive taxa), following a precautionary approach and given limited information on likely change in flow and baseline informations' status of this WFD element.		Receptor is insensitive to impact	- Landtake will reduce the availability of macroinvertebrate habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids). No baseline data available, but effects are likely to be minor and localised	- Loss of macrophytes may lead to indirect effects on macroinvertebrates, due to loss of habitat No baseline data available, but it is not important fish populations (localised impact , not affecting the WFD status for this element	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert) may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediate downstream area). - This would only be affect a limited distance of the watercourse and potential effects are considered to be minimal.	N/A	- Re-alignments associated with culverts and other habitat creation immediately upstream and downstream of culverts will incorporate a range of habitats suitable for colonisation. The effect on this quality element is considered to be minor positive.	- Minor and localised effects, no change in WFD class of element.	Minor and localised effects, no change in WFD class of element.	No upstream water bodies	- Radstone Brook does not currently have a WFD status for macroinvertebrates, is not known to be monitored for this element and/or baseline data were collected on this watercourse. - Although the scheme will lead to a loss of habitat, this will be localised - Taking into account embedded mitigation (such as the inclusion of habitat creation immediately upstream and downstream of culverts) it is anticipated that there would only be minor and localised adverse effects, with no change to the current and future status of this element. - Further assessment of changes to groundwater flows on surface water required.	None required.	No additional mitigation measures required for invertebrates, but mitigation measures proposed for fish (see below) will provide to some further mitigation for this element. - Further assessment of changes to groundwater flows on surface water required.	Further assessment of changes to groundwater flows on surface water required.
	4. Fish	-	-	- There will be potential effects on fish over the 640 m length of the existing small tributary that lies within the diverted section. -No baseline data are available for the ditch, but given its small size and current lower plantform, it is only likely to be characterised by minor fish species and unlikely to be a significant refuge or spawning habitat for the wider water environment. - It is anticipated that fish will re-establish within 1 to 2 years of completion of the river diversion within the diverted channel, while within approximately 230 m that may be permanently lost to construction effects on fish and fish habitat will be given that this is a minor ditch, only localised effects are anticipated	- The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities.	No significant hydromorphological effects anticipated	No baseline data available on Radstone Brook, but important fish populations, including migratory brown trout, are recorded downstream on the Greater Ouse watercourse - These impacts have the potential to reduce the fish element by altering dry weather flows to the watercourse (possible loss of flow sensitive taxa), following a precautionary approach and given limited information on likely change in flow and baseline informations' status of this WFD element.		Possible temporary sub-lethal effects on fish (e.g. displacement from impacted area). - effects are likely to be temporary and localised	- Landtake will reduce the availability of fish habitats within culverted sections. - There is also the potential for impacts during construction (e.g. release of suspended solids). - No baseline data available on Radstone Brook, but important fish populations, including migratory brown trout, are recorded downstream on the Greater Ouse watercourse - These impacts have the potential to reduce the fish element by altering dry weather flows to the watercourse (possible loss of flow sensitive taxa), following a precautionary approach and given limited information on likely change in flow and baseline informations' status of this WFD element.	- Loss of macrophytes may lead to indirect effects on fish, due to loss of habitat - No baseline data available, but this will have a minor impact , not affecting the WFD status for this element	- Localised changes in flow dynamics (potential increased flow due to the straightened channel in the culvert) and the presence of several culverts within a short distance have the potential to impede upstream passage of any migratory fish. - No baseline data available on Radstone Brook, but important fish populations, including migratory brown trout, are recorded downstream on the Greater Ouse watercourse which may use this tributary for spawning - There is very limited information on the design of the culverts. - A precautionary approach has been adopted and it is considered that there would be a potential deterioration of this WFD element if the impact is not mitigated	N/A	- Re-alignments associated with culverts and other habitat creation immediately upstream and downstream of culverts will incorporate a range of habitats suitable for colonisation. The effect on this quality element is considered to be minor positive.	- No impact. Runoff will be collected by drainage its balancing pond.	Minor and localised effects, no change in WFD class of element.	Minor and localised effects, no change in WFD class of element.	No upstream water bodies	- Radstone Brook does not currently have a WFD status for fish, is not known to be monitored for this element and no fish baseline data were collected. - Important fish populations, including migratory brown trout, are recorded downstream on the Greater Ouse watercourse, which may use this tributary for spawning - A precautionary approach has been adopted and it is considered that there would be a potential deterioration of this WFD element if the impact is not mitigated - Embedded mitigation measures (i.e. habitat creation immediately upstream and downstream of culverts) may not be sufficient in negating adverse effects to fish migration or loss of habitat. - Further assessment of changes to groundwater flows on surface water required.	None required.	- Further surveys to assess the value of the tributary for fish should be undertaken as part of the assessment to inform the detailed design of the culvert and habitat improvements. - An assessment of flows and fish passage within culverts must be assessed to inform detailed design of culverts and stream re-alignment. It may be necessary to provide 'rest' areas in re-aligned sections of watercourse between each of the culverts. - It is also proposed that habitat creation should be extended to the section of Radstone Brook downstream culvert SWC_7. This section of the watercourse is currently linear and likely to be of limited quality as fish habitat. As mitigation for the loss of habitat within culverts, it is proposed that the channel will no longer access link to fish (due to culverts creating barrier that cannot be mitigated), channel morphology modifications (i.e. improved sinuosity) and habitat improvements (notably the creation of spawning habitat if subsequent surveys indicate that this would be appropriate) should be made within this section. - Further, construction and post-construction monitoring should be considered (if necessary) to assess any effects on fish migration. - Further assessment of changes to groundwater flows on surface water required.	Minor and localised effects - Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	Physico-Chemical status																					
WFD classification elements	5. Dissolved Oxygen	High	-	N/A	• Release of sediment during construction of new channel will result in increased turbidity and a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel will provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor locally, with no degradation of the element status anticipated at the scale of the water body.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	No significant change to water quality likely. No effects anticipated	N/A	N/A	Due to the length of the culverts, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel will provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor locally, with no degradation of the element status anticipated at the scale of the water body.	• Water quality could be temporarily reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	No significant change to water quality likely. No effects anticipated	No upstream water bodies	- Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. - No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from road drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS) to ensure that the quality of the receiving waters is protected. Where controlled discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	Minor and localised effects. Further assessment of changes to groundwater flows on surface water required.	
	6. pH	High	-	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No upstream water bodies					
	7. Phosphate	Good	-	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphates from source and diffuse pollution.	No significant change to water quality likely. No effects anticipated	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	• Water quality could be temporarily reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	No significant change to water quality likely. No effects anticipated	No upstream water bodies					
	8. Ammonia	High	-	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	No significant change to water quality likely. No effects anticipated	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	• Water quality could be temporarily reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	No significant change to water quality likely. No effects anticipated	No upstream water bodies					
	9. Temperature	-	-	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culverts, there is likely to be a minor impact on temperature. This impact is likely to have a minor effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No upstream water bodies					
	10. Specific Pollutants (Annex VIII)	High	-	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	No significant change to water quality likely. No effects anticipated .	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	• Water quality could be temporarily reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	No significant change to water quality likely. No effects anticipated	No upstream water bodies					
	Hydromorphological status																					**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow			N/A	N/A	• Channel width appears to be 2m or less. so there is unlikely to be significant change in the quantity of the baseflow. However, as the tributary joins the Radstone Brook, a small watercourse leading to the Great Ouse and in practical terms represents a small proportion of the water body • Proposed realignment will shorten the local channel reach • Shortening the channel could increase gradients and flow velocities, and the tendency for bed and bank scour Flow levels could be increased downstream as the channel gradient levels off, which could increase channel spilling • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of shortening the watercourse still needs to be flagged as a risk						N/A	N/A	N/A	• The size of the channel, which is not visible due to bank side vegetation, appears to be 2m width or less, meaning there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off by the culverts and in-channel flows may become deeper than natural pond flows, and may even surcharge in extreme events • These sections of the channel are likely to be mainly trunk and first and second order streams within a fen water body, and in practical terms the culvert would impact a small proportion of the water body, although there are existing culverts for minor roads and some historic channel straightening	N/A	N/A	• Potential reduction in channel flows during construction phase, which would be reversed post construction • water body is a Drain Dominated Fen Sund Drainage, but the quantity of flow and dynamics currently support good status • Reduction of flows is likely to deteriorate existing flow dynamics (flow rates, velocities, natural variations etc.), and the culverts are thought to be temporary and future objectives would not be impeded	N/A	No upstream water bodies	• The culverts are quite extensive and likely to cause deterioration. The diversion may have impacts on scour and sediment deposition, which should be monitored • Even though the diversion and culverts are on minor tributaries, and overall would not cause deterioration to the principal watercourse, the cumulative effects of multiple culverts and historic channel straightening and culverts is likely to be significant • Dewatering during construction could be detrimental to flow dynamics, but this would be a temporary effect and reversible post construction	Undertaken hydromorphological surveys to aid detailed design development Incorporate hydromorphological mitigation into detailed design where practicable. Mitigation measures that might be incorporated into the detailed design include: • Bank re-profiling (embankments) • Creation of riffle-pool sequences • Creation of shallow margin in front of hard defence • Kerbed silt, sand or gravel traps • Introduce riparian vegetation/green corridors where space allows • Recreate a sinuous river channel in re-meandering where space allows • Incorporate in-channel habitat enhancement/ bed structures (increase morphological diversity) • Bench marginal habitats • Use of engineering techniques to assist natural recovery • Use soft engineering techniques	Minor and localised effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater		N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	• Potential reduction in channel flows during construction phase, which would be reversed post construction	N/A	No upstream water bodies					
	13. River continuity			N/A	N/A	• Shortening the channel may result in accelerated flows and reduced channel storage capacity, which in turn could increase overbank spillage and floodplain connectivity downstream • The size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected		• There are possible reductions to base flow in Radstone Brook but the ES states that sufficient flow will continue to feed the watercourse due to aquifer thickness • There is unlikely to be a significant impact on the hydromorphology of the watercourse unless there is a significant reduction in flow, which is unlikely. The effect from culverts, such as increase in flows from the redirection of drainage from the cutting which could affect the dynamics of flow and the width and depth of the watercourse. This is uncertain at present, but localised risks are highlighted	N/A	N/A	N/A	N/A	• The culverts would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both culverted reaches • However, in wider terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A	N/A	• Hydraulic effects would be temporary, but the combination of inevitable increase in sediment due to construction and reduced flows could be detrimental to continuity during this time	N/A	No upstream water bodies					
	14. River depth and width variation			N/A	N/A	• The diversion would replicate existing channel geometry - increasing flow rates may result in local scour of the bed and banks, which would promote morphological diversity and allow the channel to form a dynamic equilibrium form • Some local scour and substrate deposition would likely occur immediately downstream • Overall , there is unlikely to be significant channel change				N/A	N/A	N/A	• Out-of-bank flows would be severed by the culvert, and in-channel flows may become deeper than natural pond flows, and may even surcharge in extreme events • The size of the channel suggests there would not be significant loss of diversity in river depth and width • However, the cumulative effects of multiple culverts and historic channel modifications could be significant	N/A	N/A	• Reduction of flows could decrease flow depth, wetted perimeter and hydraulic radius, but the effects are likely to be temporary and reversible	N/A	No upstream water bodies					
	15. Structure and substrate of river bed			N/A	N/A	• Shortening the channel could increase gradients and flow velocities, and the tendency for bed scour • This could result in loss of substrates in the shortened reach, but increased diversity of bed formations immediately downstream and possibly increased sediment deposition • The locally increased gradients may trigger bed scour upstream as the channel attempts to smooth its bed gradient • Given the size of the channel there is unlikely to be major adjustment, but this is still a risk				N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant diversity of bed form and substrate • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk • The cumulative effects of multiple culverts and historic channel modifications could be significant	N/A	N/A	• Combination of inevitable increase in sediment due to construction and reduced flows could be detrimental to bed habitats. The effect of increased sedimentation - if it occurs during the construction phase - would be reversible but could persist for several years after construction ceases	N/A	No upstream water bodies					
	16. Structure of riparian zone	-	-	N/A	N/A	• There is unlikely to be any net change to existing bank, riparian and floodplain structure and connectivity with channel		N/A	N/A	N/A	N/A	• The culvert would disconnect the channel from the existing vegetated narrow riparian zones (mature trees) and sever any existing riparian habitat continuity along the channel.	N/A	N/A	• Hydraulic connectivity with riparian zones could be decreased if flows are reduced, but this would be temporary and likely to have no significant effects in the medium to long term	N/A	No upstream water bodies					

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen																		
Sediment management strategies (dredging and menes)	-	-	N/A	N/A	• Nature of impact means that opportunities to implement these measures could be limited in this particular watercourse as a result of the scheme, but the impact on this tributary is unlikely to inhibit future implementation of measures at water body scale	• Nature of impact means that opportunities to implement these measures could be limited in this particular watercourse as a result of the scheme, but the impact on this tributary is unlikely to inhibit future implementation of measures at water body scale	N/A	N/A	N/A	N/A	• Nature of impact means that opportunities to implement these measures could be limited in this particular watercourse as a result of the scheme, but the impact on this tributary is unlikely to inhibit future implementation of measures at water body scale	N/A	N/A	• Nature of impact means that opportunities to implement these measures could be limited in this particular watercourse as a result of the scheme, but the impact on this tributary is unlikely to inhibit future implementation of measures at water body scale	N/A	N/A	N/A	N/A	N/A	N/A
Appropriate techniques (invasive species)	-	-	Measures included as part of CoCP will ensure no significant effects	Measures included as part of CoCP will ensure no significant effects			Measures included as part of CoCP will ensure no significant effects	Measures included as part of CoCP will ensure no significant effects	Measures included as part of CoCP will ensure no significant effects	Measures included as part of CoCP will ensure no significant effects		Measures included as part of CoCP will ensure no significant effects	Measures included as part of CoCP will ensure no significant effects		Measures included as part of CoCP will ensure no significant effects	N/A	No effects anticipated	None required.	None required.	No effects anticipated	N/A
Appropriate timing (vegetation control)	-	-	N/A	N/A			N/A	N/A	N/A	N/A		N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A
Appropriate vegetation control technique	-	-	No effects anticipated	No effects anticipated			No effects anticipated	No effects anticipated	No effects anticipated	No effects anticipated		No effects anticipated	No effects anticipated		No effects anticipated	N/A	No effects anticipated	None required.	None required.	No effects anticipated	N/A
Selective vegetation control regime	-	-	No effects anticipated	No effects anticipated			No effects anticipated	No effects anticipated	No effects anticipated	No effects anticipated		No effects anticipated	No effects anticipated		No effects anticipated	N/A	No effects anticipated	None required.	None required.	No effects anticipated	N/A
Appropriate channel maintenance strategies and techniques - minimise disturbance to channel bed and margins	-	-	N/A	N/A			N/A	N/A	N/A	N/A		N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Cutting and cover tunnel		Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	-
	GB105033038230	Poor	Good ecological potential by 2027	Description of scheme element impact	Greatworth cut & cover tunnel				Construction	Operation		
	Helmdon Brook			Identified biological impacts	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due	Change in water quality due to discharge of groundwater to a surface water body.						
WFD classification elements	diatoms	Poor	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	Not assessed	-		This is an amber effect in the groundwater spread sheet. However, only 1 spring at Painters Spinney is within the RoI, and there are numerous other springs that feed the brook outside the RoI further downstream. Therefore, with the exception of the area at the head of the watercourse, the likelihood is that there won't be significant changes in flow in the Helmdon Brook. No baseline data were available, but the watercourse is currently of 'poor' overall ecological potential, and is therefore unlikely to support diverse macrophyte, macroinvertebrate or fish communities that would be sensitive	No likely change in water quality anticipated, discharges managed by CoCP.	No impacts from other water bodies identified.	No effect or only minor/localised effects anticipated, with no change in WFD element anticipated.	None required.	None required.	No effect or only minor/localised effects anticipated, with no change in WFD element anticipated.	-
	3. Macroinvertebrates	Not assessed	-			No likely change in water quality anticipated, discharges managed by CoCP.	No impacts from other water bodies identified.	No effect or only minor/localised effects anticipated, with no change in WFD element anticipated.	None required.	None required.	No effect or only minor/localised effects anticipated, with no change in WFD element anticipated.	-
	4. Fish	Not assessed	-			No likely change in water quality anticipated, discharges managed by CoCP.	No impacts from other water bodies identified.	No effect or only minor/localised effects anticipated, with no change in WFD element anticipated.	None required.	None required.	No effect or only minor/localised effects anticipated, with no change in WFD element anticipated.	-
	Physico-Chemical status											
WFD classification elements	5. Dissolved Oxygen	Not assessed	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	No likely change in water quality anticipated, discharges managed by CoCP.	No impacts from other water bodies identified.	Potential minor and localised effects on element.	None required.	None required.	N/A	-
	6. pH	Not assessed	-		Receptor is insensitive to impact	Receptor is insensitive to impact	No impacts from other water bodies identified.	Receptor is insensitive to impact	None required.	None required.	N/A	-
	7. Phosphate	Not assessed	-		• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	No likely change in water quality anticipated, discharges managed by CoCP.	No impacts from other water bodies identified.	Depending on how much flow is lost, potential minor and localised effects on element.	None required.	None required.	N/A	-
	8. Ammonia	Not assessed	-		• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects.	No likely change in water quality anticipated, discharges managed by CoCP.	No impacts from other water bodies identified.	Potential minor and localised effects on element.	None required.	None required.	N/A	-
	9. Temperature	Not assessed	-		Receptor is insensitive to impact	Receptor is insensitive to impact	No impacts from other water bodies identified.	Receptor is insensitive to impact	None required.	None required.	N/A	-
	10. Specific Pollutants (Annex VIII)	Not assessed	-		• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects.	No likely change in water quality anticipated, discharges managed by CoCP.	No impacts from other water bodies identified.	Potential minor and localised effects on element.	None required.	None required.	N/A	-
	Hydromorphological status											**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	• Reduction of flows in Helmdon Brook could cause a localised reduction in flow volumes, depths and dynamics, and consequent reductions in sediment transport (and increased sediment deposition) and reduced out-of-channel habitat connectivity. The impacts would be localised in headwaters, and would be buffered in second order or larger watercourses.	N/A	No impacts from other water bodies identified.	• Reduction of flows in Helmdon Brook could cause a localised reduction in flow and affect hydraulic and sediment regimes and habitat connectivity. The impacts would be localised in headwaters, and would be buffered in second order or larger watercourses.	None required.	None required.	N/A	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-			N/A	No impacts from other water bodies identified.		None required.	None required.		
	13. River continuity	-	-			N/A	No impacts from other water bodies identified.		None required.	None required.		
	14. River depth and width variation bed	-	-			N/A	No impacts from other water bodies identified.		None required.	None required.		
	15. Structure and substrate of river bed	-	-			N/A	No impacts from other water bodies identified.		None required.	None required.		
	16. Structure of riparian zone	-	-			N/A	No impacts from other water bodies identified.		None required.	None required.		

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	-	-	-	-	-	-	-	-	-
Sediment management strategies (develop and revise) - in place	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	No likely impacts on objective.	N/A
Appropriate techniques (invasive species) - in place	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No likely impacts on objective.	N/A
Appropriate timing (vegetation control) - in place	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No likely impacts on objective.	N/A
Appropriate vegetation control technique - in place	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No likely impacts on objective.	N/A
Selective vegetation control regime - in place	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No likely impacts on objective.	N/A
Appropriate channel maintenance strategies and techniques - minimise disturbance to channel bed and margins - not in place	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No likely impacts on objective.	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Greatworth Green Tunnel		Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	-
	GB106039037290	Poor	Good Ecological Status by 2027	Description of scheme element impact	Minor change to catchment divide between Helmdon Brook, Farthinghoe Stream Ouse Beds and Cherwell				Construction	Operation		
	Farthinghoe Stream			Identified biological impacts	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	Poor	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	-	-		Minor and localised effects, no change in WFD class of element.	No significant effects anticipated as best practice guidance for discharge will be followed.	No upstream water bodies.	Potential minor and localised effects on element.	None required.	None required.	N/A	-
	3. Macroinvertebrates	High	-		Minor and localised effects, no change in WFD class of element.	No significant effects anticipated as best practice guidance for discharge will be followed.	No upstream water bodies.	Potential minor and localised effects on element.	None required.	None required.	N/A	-
	4. Fish	High	-		Minor and localised effects, no change in WFD class of element.	No significant effects anticipated as best practice guidance for discharge will be followed.	No upstream water bodies.	Potential minor and localised effects on element.	None required.	None required.	N/A	-
	Physico-Chemical status											
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	No significant effects anticipated as best practice guidance for discharge will be followed.	No upstream water bodies.	Potential minor and localised effects on element.	None required.	None required.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	-
	6. pH	High	-		Receptor is insensitive to impact	Receptor is insensitive to impact	No upstream water bodies.	Receptor is insensitive to impact	None required.	None required.		-
	7. Phosphate	Poor	-		• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	No significant effects anticipated as best practice guidance for discharge will be followed.	No upstream water bodies.	Depending on how much flow is lost, potential minor and localised effects on element. One sewage discharge consent to Farthinghoe Stream.	None required.	None required.		-
	8. Ammonia	High	-		• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	No significant effects anticipated as best practice guidance for discharge will be followed.	No upstream water bodies.	Potential minor and localised effects on element.	None required.	None required.		-
	9. Temperature	-	-		Receptor is insensitive to impact	Receptor is insensitive to impact	No upstream water bodies.	Receptor is insensitive to impact	None required.	None required.		-
	10. Specific Pollutants (Annex VIII)	High	-		• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	No significant effects anticipated as best practice guidance for discharge will be followed.	No upstream water bodies.	Potential minor and localised effects on element.	None required.	None required.		-
	Hydromorphological status											**Hydromorphology**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	• A minor reduction of flows resulting from groundwater alterations could cause a localised reduction in flow volumes, depths and dynamics, and consequent reductions in sediment transport (and increased sediment deposition) and reduced out-of-channel habitat connectivity. The effect would be localised to headwaters and is likely to be buffered further downstream due to additional catchment area and inflows	N/A	No upstream water bodies.	N/A	None required.	None required.	N/A	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-				No upstream water bodies.	N/A	None required.	None required.	N/A	
	13. River continuity	-	-				No upstream water bodies.	N/A	None required.	None required.	N/A	
	14. River depth and width variation bed	-	-				No upstream water bodies.	N/A	None required.	None required.	N/A	
	15. Structure and substrate of river bed	-	-				No upstream water bodies.	N/A	None required.	None required.	N/A	
	16. Structure of riparian zone	-	-				No upstream water bodies.	N/A	None required.	None required.	N/A	

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	-	-	-	-	-	-	-	-	-
NONE	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Viaduct					River Diversion			Viaduct					River Diversion		
GB106039037350	Moderate	Good status by 2027	**Description of scheme element impact**	River Cherwell: The 13 span viaduct has a deck length of 540m and the spans would have an average height (ground to soffit) of 2 - 2.5m. The viaduct is located to the north-east of Edgcote and crosses the River Cherwell and Mill Lane. The viaduct would not cross the watercourse but would be close enough to its banks to potentially exert impacts - CFA15-SWC7 (108+620)					River Cherwell: Edgcote viaduct, 150 m - CFA15-SWC20 (108+440) and 70 m - CFA15-SWC7 (108+620)			Lower Thorpe Brook and Unnamed tributary: Lower Thorpe viaduct, Unnamed Tributary: Edgcote viaduct					Unnamed tributary of the River Cherwell (Lower Thorpe Embankment) at Culworth South culvert and Lower Thorpe Brook - Thorpe Mandeville Embankment - 285 m (SWC-CFA15-19)		
Cherwell (Ashby Brook to Cropredy)			**Identified biological impacts**	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream
WFD classification elements	**1.Macrophytes and phytobenthos - diatoms**	N/A	N/A	**Predicted change to status elements (green = none, amber = possible, red = likely)**	n/a	n/a	n/a	n/a	n/a	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	-	-		Receptor not sensitive to impact. No likely effect anticipated.	The river diversion should avoid viaduct footings to be within river channel. The watercourse supports locally frequent aquatic vegetation (ecology baseline surveys). No likely effect anticipated.	Likely to lead to localised loss of macrophytes, due to reduction of photosynthetic activity. The watercourse supports locally frequent aquatic vegetation (ecology baseline surveys). Very localised adverse effect.	No significant hydromorphological impacts anticipated, therefore no effects on macrophytes.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	The new channels will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. The watercourse supports locally frequent aquatic vegetation (ecology baseline surveys). The effect on this quality element is considered to be minor beneficial and localised.	Potential increase in flow velocities and increase in sediment transport rates, that may increase morphological and channel diversity. The watercourse supports locally frequent aquatic vegetation (ecology baseline surveys). Negligible effect anticipated.	Receptor not sensitive to impact. No likely effect anticipated.	There will be no viaduct footings within river channel. Lower Thorpe Brook supports locally frequent aquatic vegetation (ecology baseline surveys). No data for the stream running underneath Edgcote viaduct. For the unnamed tributary underneath Lower Thorpe viaduct (drainage ditches), they support no aquatic vegetation (baseline surveys). Very localised adverse effect anticipated.	Likely to lead to very localised loss of macrophytes, due to the reduction of photosynthetic activity. Lower Thorpe Brook supports locally frequent aquatic vegetation (ecology baseline surveys). No data for the stream running underneath Edgcote viaduct. For tributaries underneath Lower Thorpe viaduct (drainage ditches), they support no aquatic vegetation (baseline surveys). Very localised adverse effect anticipated.	No significant hydromorphological impacts anticipated, therefore no effects on macrophytes.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Temporary loss of approximately 300 m of habitats of the existing Lower Thorpe Brook and Unnamed tributary that lie within the diverted section while the new channels re-establish. It is anticipated that the macrophyte community will re-establish within 1 to 2 years of completion of the river diversion. Lower Thorpe Brook supports locally frequent aquatic vegetation (ecology baseline surveys) and no baseline data is available for the unnamed tributary. Temporary and localised adverse effect anticipated.	The new channel will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. Lower Thorpe Brook supports locally frequent aquatic vegetation (ecology baseline surveys) and no baseline data is available for the unnamed tributary. Localised beneficial effect anticipated.	Existing channel of Lower Thorpe Brook appears modified, over-deepened and straightened locally (baseline surveys). No hydromorphological effects anticipated, and therefore no effects on macrophytes.
	3. Macroinvertebrates	High	High		Receptor not sensitive to impact. No likely effect anticipated.	There will be no viaduct footings in the diverted river channel. No local data available for macroinvertebrates. No likely effect anticipated.	Likely to lead to very localised but permanent reduction of habitat available to macroinvertebrates (i.e. aquatic vegetation, riparian vegetation). By default, very localised adverse effect with no degradation of the element status anticipated at the scale of the water body.	No significant hydromorphological impacts anticipated, therefore no effects on macroinvertebrates.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Temporary loss of approximately 220 m of habitats of the existing River Cherwell that lies within the diverted section while the new channels re-establish. It is anticipated that the macrophyte community will re-establish within 1 to 2 years of completion of the river diversion. The watercourse supports locally frequent aquatic vegetation (ecology baseline surveys). Temporary localised adverse effect.	The river diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach. No local data available for macroinvertebrates. Locally beneficial effect anticipated, with no degradation of the status of this element expected at the water body scale.	Potential increase in flow velocities and increase in sediment transport rates, that may increase morphological and channel diversity. No local data available for macroinvertebrates. Localised beneficial effect anticipated if habitat diversification associated with hydromorphological changes. No change anticipated for the element status at the scale of the water body.	Receptor not sensitive to impact. No likely effect anticipated.	The river diversions should avoid viaduct footings to be within river channel. Lower Thorpe Brook supports locally poor to moderate macroinvertebrate quality (ecology baseline surveys). No data available for the other tributaries. Very localised adverse effect anticipated.	Increase in shade likely to lead to very localised but permanent reduction of habitat available to macroinvertebrates (i.e. aquatic vegetation, riparian vegetation). Lower Thorpe Brook supports locally poor to moderate macroinvertebrate quality (ecology baseline surveys). No data available for the other tributaries. Very localised adverse effect anticipated.	No significant hydromorphological impacts anticipated, therefore no effects on macroinvertebrates.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Temporary loss of approximately 300 m of habitats of the existing Lower Thorpe Brook and Unnamed tributary that lie within the diverted section while the new channels re-establish. Lower Thorpe Brook locally supports poor to moderate macroinvertebrate quality and no data is available for the Unnamed Tributary (ecology baseline surveys). Temporary and minor adverse effect anticipated.	The river diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach. Lower Thorpe Brook locally supports poor to moderate macroinvertebrate quality and no data is available for the Unnamed Tributary (ecology baseline surveys). Locally beneficial effect anticipated, with no degradation of the status of this element expected at the water body scale.	Existing channel of Lower Thorpe Brook appears modified, over-deepened and straightened locally (baseline surveys). No significant hydromorphological impacts anticipated therefore no effects on macroinvertebrates.
	4. Fish	Good	Good		Localised and temporary effect during construction. No deterioration of the water body status of the element is however expected.	The river diversion should avoid viaduct footings to be within river channel. No local data available for fish.. No likely effect anticipated.	Likely to lead to very localised but permanent reduction of habitat available (i.e. aquatic vegetation, riparian vegetation). No local data available for fish, but Environment Agency historic data showed low fish diversity (baseline ecology report). By default, very localised adverse effect with no degradation of the element status anticipated at the scale of the water body.	No significant hydromorphological impacts anticipated, therefore no effects on fish.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Temporary loss of approximately 220 m of habitats of the existing River Cherwell that lies within the diverted section while the new channels re-establish. No local data available for fish, but Environment Agency historic data showed low fish diversity (baseline ecology report). Fish kills expected while dewatering existing channel. By default, temporary adverse effect, with no degradation of the element status anticipated at the scale of the water body.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities. No local data available for fish, but Environment Agency historic data showed low fish diversity (baseline ecology report). Localised beneficial effect anticipated, with no degradation of the status of this element expected at the water body scale.	Potential increase in flow velocities and increase in sediment transport rates, that may increase morphological and channel diversity. No local data available for fish, but Environment Agency historic data showed low fish diversity (baseline ecology report). Localised beneficial effect anticipated if habitat diversification associated with hydromorphological changes. No change anticipated for the element status at the scale of the water body.	Localised and temporary effect during construction. No deterioration of the water body status of the element is however expected.	The river diversions should avoid viaduct footings to be within river channel. Lower Thorpe Brook supports poor fish habitat and low fish abundances and diversity (baseline surveys). No data available for the other tributaries. Very localised adverse effect anticipated.	Likely to lead to very localised but permanent reduction of habitat available (i.e. aquatic vegetation, riparian vegetation). Lower Thorpe Brook supports poor fish habitat and low fish abundances and diversity (baseline surveys). No data available for the other tributaries. Very localised adverse effect anticipated.	No significant hydromorphological impacts anticipated, therefore no effects on fish.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Temporary loss of approximately 300 m of habitats of the existing Lower Thorpe Brook and Unnamed tributary that lie within the diverted section while the new channels re-establish. Lower Thorpe Brook supports poor fish habitat and low fish abundances and diversity and low baseline data is available for the Unnamed tributary (baseline surveys). Fish kills expected while dewatering existing channel. Temporary and minor adverse effect anticipated.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities. New channel is likely to provide improved macroinvertebrate habitats if diversification associated with the diversion. Lower Thorpe Brook supports poor fish habitat and low fish abundances and diversity and no baseline data is available for the Unnamed tributary (baseline surveys).. Locally beneficial effect anticipated, with no degradation of the status of this element expected at the water body scale.	Existing channel of Lower Thorpe Brook appears modified, over-deepened and straightened locally (baseline surveys). No significant hydromorphological impacts anticipated therefore no effects on fish.
	Physico-Chemical status																		
WFD classification elements	**5. Dissolved Oxygen**	-	-	**Predicted change to status elements (green = none, amber = possible, red = likely)**	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor beneficial with no degradation of current status anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor with no degradation of current status anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.
	6. pH	-	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact
	7. Phosphate	-	-		N/A	N/A	N/A	ly an open span bridge, so there would	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/Temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	N/A	N/A	N/A	ly an open span bridge, so there would	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/Temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.
	8. Ammonia	-	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact
	9. Temperature	-	-		N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact
	10. Specific Pollutants (Annex VIII)	-	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
	Hydromorphological status																		
WFD classification elements	**11. Quantity and dynamics of river flow**	-	-	**Predicted change to status elements (green = none, amber = possible, red = likely)**	N/A	N/A	N/A	• Footings in floodplain will have small impact at times of high flood flow • Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	N/A	• The channel would be slightly shorted, so there would be no creation of habitats	• Proposed realignment would replicate channel planform but would slightly shorten the local channel reach • Shortening the channel could increase gradients and flow velocities, and the tendency scour of the bed and bank	N/A	N/A	N/A	• Footings in floodplain will have small impact at times of high flood flow • Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	N/A	• It is assumed that the small watercourse is realigned into a culvert at Lower Thorpe Embankment • Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics • Unnamed tributary of the River Cherwell is a minor tributary and in practical terms represents a small proportion of the water body • Lengthening the channel may reduce flow rates although the diversion is not far from the existing channel course • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of lengthening the watercourse still needs to be flagged as a risk	• The extent of new watercourse that would be created, and the possible negative effects of altering existing channel conditions, mean that there would be no significant habitat creation
	12. Connection to Groundwater	-	-		N/A	N/A	N/A		N/A	N/A		• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A		N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	
	13. River continuity	-	-		N/A	N/A	N/A		N/A	N/A		• The channel is within a well developed floodplain appears to have good downstream and lateral continuity. The scale of the diversion would not affect this.	N/A	N/A	N/A		N/A	N/A	• Lengthening the channel may result in increased channel storage and reduced floodplain connectivity, but the size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected	
	14. River depth and width variation bed	-	-		N/A	N/A	N/A		N/A	N/A		• The channel in this reach appears to be morphologically stable at present, so any engineering could prompt adjustment back to its equilibrium form and this would need to be carefully managed. • This may mean local scour of the bed and banks which would promote morphological diversity, but there is a concern that the diversion could trigger long term channel adjustment, albeit not on a large scale	N/A	N/A	N/A		N/A	N/A	• The diversion would replicate existing channel geometry. Out of channel flow depths may decrease as a result of lengthening the channel, but in practical terms there would be no significant change	
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A		N/A	N/A		• Shortening the channel could increase gradients and sediment transport rates • This is unlikely to be a major effect, e.g. there is unlikely to be significant loss of substrate habitats or disruption to pool-riffle sequences, rather the effects are more likely to result in some channel diversity and habitat renewal as the channel adjusts. However, this is still a risk that requires further investigation	N/A	N/A	N/A		N/A	N/A	• Lengthening a channel tends to reduce flow rates and increase deposition of sediment • Given the size of the watercourse there would probably be no measurable impact	
	16. Structure of riparian zone	-	-		N/A	N/A	N/A		N/A	N/A		• No net change to existing bank, riparian and floodplain structure and connectivity with channel	N/A	N/A	N/A		N/A	N/A	• Although channel capacity would increase, there is likely to be no net change to existing bank, riparian and floodplain structure and connectivity with channel	

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen																	
NONE	-	-	**Predicted change to status elements (green = none, amber = possible, red = likely)**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	River Diversion			Culvert					Cutting		Cutting		Green Tunnel	
GB106039037350	Moderate	Good status by 2027	**Description of scheme element impact**	Tributary of the River Cherwell: Edgcote viaduct - 50 m - CFA15-SWC6 (108+330)			Multiple Culverts - Two channel diversions and five culverts on tributaries of the River Cherwell (upper reaches): Culworth South culvert- 50 m - CFA15-SWC5 (105+825), Osierbed Spinney culvert - 45 m - CFA15-SWC21 (108+870), Thorpe Mandeville cutting - 80 m - CFA15-SWC1 (104+400)				Edgcote Roman Villa cutting - Approximately 108+000		Thorpe Mandeville cutting, Lower Thorpe South cutting, Lower Thorpe North cutting - Approximately 105+000		Greatworth Green Tunnel	
Cherwell (Ashby Brook to Cropredy)			**Identified biological impacts**	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	-	-		Temporary loss of approximately 50 m of habitats of the existing tributary that lies within the diverted section while the new channel re-establish. It is anticipated that the macrophyte community will re-establish within 1 to 2 years of completion of the river diversion. No local data available for macrophytes. By default, temporary adverse effect anticipated.	The new channel will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. No data available for macrophytes. Potentially localised beneficial effect anticipated.	Potential increase in flow velocities and increase in sediment transport rates, that may increase morphological and channel diversity. No data available for macrophytes. Potentially localised beneficial effect anticipated.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to the permanent loss of a total of approximately 200 m of habitat. No macrophytes data available for the tributary at Thorpe Mandeville cutting. The two other tributaries (drainage ditches) support no aquatic vegetation. Given the small size of the tributaries, no change in the element status anticipated at the scale of the water body.	Likely to lead to the permanent and localised loss of macrophytes. No macrophytes data available for the tributary at Thorpe Mandeville cutting, The two other tributaries (drainage ditches) support no aquatic vegetation. By default, negligible to very localised adverse effect anticipated.	No significant hydromorphological impacts anticipated, therefore no effects on macrophytes.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run off from the proposed railway. No anticipated change in water quality.	Potential to affect base flows and spring flows on tributaries of the River Cherwell. Potential adverse effect anticipated.	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	Potential to affect springs and tributaries of the River Cherwell. Local effect on flows on upper 800 m of Culworth Brook (tributary of River Cherwell). Potential adverse effect anticipated.	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	Potential to temporarily affect base flows on springs and tributaries of the River Cherwell at Thorpe Mandeville. Potential minor adverse effect anticipated.	Potential localised and temporary changes in water quality in tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.
	3. Macroinvertebrates	High	High		Temporary loss of approximately 50 m of habitats of the existing tributary that lies within the diverted section while the new channel re-establish. No local data available for macroinvertebrates. By default, temporary adverse effect, with no degradation of the element status anticipated at the scale of the water body.	The river diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach. No local data available for macroinvertebrates. By default, potentially localised beneficial effect anticipated. No degradation of the status of this element expected at the water body scale.	Potential increase in flow velocities and increase in sediment transport rates, that may increase morphological and channel diversity. No local data available for macroinvertebrates. Localised beneficial effect anticipated, with no change anticipated for the element status at the scale of the water body.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to the permanent loss of a total of approximately 200 m of macroinvertebrate habitats. No macroinvertebrate data available for any of the tributaries. Localised adverse effect on the tributaries. Given the small size of the tributaries, no change in the element status anticipated at the scale of the water body.	No additional effect anticipated (loss of habitat already considered in the landtake impact).	Culverts will result in localised changes to hydromorphological regime in the immediate vicinity of the culvert which may result in loss or changes to the macroinvertebrate community.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run off from the proposed railway. No anticipated change in water quality.	Potential to affect base flows and spring flows on tributaries of the River Cherwell. Potential adverse effect anticipated.	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	Potential to affect springs and tributaries of the River Cherwell. Local effect on flows on upper 800 m of Culworth Brook (tributary of River Cherwell). Potential adverse effect anticipated.	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	Potential to temporarily affect base flows on springs and tributaries of the River Cherwell at Thorpe Mandeville. Potential minor adverse effect anticipated.	Potential localised and temporary changes in water quality in tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.
	4. Fish	Good	Good		Temporary loss of approximately 50 m of habitats of the existing tributary that lies within the diverted section while the new channel re-establish. No local data available for fish. Fish kills expected while dewatering existing channel. By default, temporary adverse effects, with no degradation of the element status anticipated at the scale of the water body.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities. No local data available for fish. By default, potentially localised beneficial effect anticipated. No degradation of the status of this element expected at the water body scale.	Potential increase in flow velocities and increase in sediment transport rates, that may increase morphological and channel diversity. No local data available for fish. Localised beneficial effect anticipated, with no change anticipated for the element status at the scale of the water body.	No data available on fish for any of the tributaries. By default, localised and temporary adverse effect during construction, with no effect anticipated at the scale of the water body.	Likely to lead to a localised but permanent loss of a total of approximately 200 m of fish habitat, and constitute obstructions to fish movements. No data available on fish for any of the tributaries. The River Cherwell supports low fish abundances and diversity (baseline surveys). However, the River Cherwell is a designated Freshwater Fish Directive water body. Given the relatively low contribution of the tributaries to the River Cherwell, which appear to be drainage ditches, only minor adverse effect anticipated, with no further effect anticipated at the scale of the water body.	No additional effect anticipated (loss of habitat already considered in the landtake impact).	Culverts will result in localised changes to hydromorphological regime, and may restrict access to upstream habitats. No fish data available, but given the relatively low contribution of the tributaries to the River Cherwell, which appear to be drainage ditches, only minor adverse effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run off from the proposed railway. No anticipated change in water quality.	Potential to affect base flows and spring flows on tributaries of the River Cherwell. Potential adverse effect anticipated.	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	Potential to affect springs and tributaries of the River Cherwell. Local effect on flows on upper 800 m of Culworth Brook (tributary of River Cherwell). Potential adverse effect anticipated.	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	Potential to temporarily affect base flows on springs and tributaries of the River Cherwell at Thorpe Mandeville. Potential minor adverse effect anticipated.	Potential localised and temporary changes in water quality in tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.

Physico-Chemical status

WFD classification elements	5. Dissolved Oxygen	-	-	Predicted change to status (green = none, amber = possibly, red = likely)	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor with no degradation of current status anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.
	6. pH	-	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	7. Phosphate	-	-		N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.
	8. Ammonia	-	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates,	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.
	9. Temperature	-	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	10. Specific Pollutants (Annex VIII)	-	-		N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Potential changes in water quality of tributaries of the River Cherwell, with no significant effect at the scale of the water body. No likely effect anticipated.

Hydromorphological status

WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status (green = none, amber = possibly, red = likely)	N/A	• The channel would be slightly shorted, so there would be no creation of habitats	• Proposed realignment would replicate channel planform but would slightly shorten the local channel reach • Shortening the channel could increase gradients and flow velocities, and the tendency scour of the bed and bank	N/A	N/A	N/A	• Culverts are on small tributaries and upper reaches of the River Cherwell • There could be significant diversity of flow dynamics, although on small water bodies • Out-of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • The upper reaches of the River Cherwell are effectively a drainage dishes within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	• Although dewatering from Edgcote Roman Villa cutting may reduce groundwater levels and contribution to surface water flows, it is unlikely that the reduction in the contribution to surface water flow will significantly impact on the hydromorphology of the watercourse. • Any reduction in the groundwater contribution to surface water flow is likely to be localised and only along a proportionately small reach of the River Cherwell compared to the feature length.	N/A	• Although dewatering from Thorpe Mandeville cutting, Lower Thorpe South cutting, Lower Thorpe North cutting may reduce groundwater levels and contribution to surface water flows, it is unlikely that the reduction in the contribution to surface water flow will significantly impact on the hydromorphology of the watercourse. • Any reduction in the groundwater contribution to surface water flow is likely to be localised and only along a proportionately small reach of the River Cherwell compared to the feature length.	N/A	• Possible minor effects in terms of reducing flows volumes and diversity, but the effect is unlikely to be measurable or significant. Risk is highlighted as part of the precautionary approach and because any minor impact could have significant implications for habitats	N/A
	12. Connection to Groundwater	-	-		N/A		• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A		N/A		N/A	• Possible minor effects in terms of reducing groundwater base flow	N/A
	13. River continuity	-	-		N/A		• The channel is within a well developed floodplain appears to have good downstream and lateral continuity. The scale of the diversion would not affect this.	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A		N/A		N/A	• Possible minor effects in terms of reducing flows and increasing sedimentation , but the effect is unlikely to be measurable or significant. Risk is highlighted as part of the precautionary approach and because any minor impact could have significant implications for habitats	N/A
	14. River depth and width variation bed	-	-		N/A		• The channel in this reach appears to be morphologically stable at present, so any engineering could prompt adjustment back to its equilibrium form and this would need to be carefully managed • This may mean local scour of the bed and banks which would promote morphological diversity, but there is a concern that the diversion could trigger long term channel adjustment, albeit not on a large scale	N/A	N/A	N/A	• Out-of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The culvert would homogenise channel morphology • Scour adjacent to the structure upstream and downstream could result in sharp changes in channel geometry and a stepped channel / perched culvert base • The size of the channel suggests there could be significant loss of diversity in river depth and width, and this is a risk	N/A		N/A		N/A	• Possible minor effects in terms of reducing flows on decreasing river depths and widths, but the effect is unlikely to be measurable or significant. Risk is highlighted as part of the precautionary approach and because any minor impact could have significant implications for habitats	N/A
	15. Structure and substrate of river bed	-	-		N/A		• Shortening the channel could increase gradients and sediment transport rates • This is unlikely to be a major effect, e.g. there is unlikely to be significant loss of substrate habitats or disruption to pool-riffle sequences, rather the effects are more likely to result in some channel diversity and habitat renewal as the channel adjusts. However, this is still a risk that requires further investigation	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour, but bed structure could be homogenised • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A		N/A		N/A	• Possible minor effects in terms of reducing flows and increasing sedimentation , but the effect is unlikely to be measurable or significant. Risk is highlighted as part of the precautionary approach and because any minor impact could have significant implications for habitats	N/A
	16. Structure of riparian zone	-	-		N/A		• No net change to existing bank, riparian and floodplain structure and connectivity with channel	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A		N/A		N/A	• Possible minor effects in terms of reducing flows and riparian connectivity, but the effect is unlikely to be measurable or significant. Risk is highlighted as part of the precautionary approach and because any minor impact could have significant implications for habitats	N/A

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen														
NONE	-	-	Predicted change to status (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements: Description of scheme element impact	Impacts from other WFD water bodies (assessed separately)	OVERALL impact on element	Proposed Mitigation Measures: Construction	Proposed Mitigation Measures: Operation	Residual impact	
	GB106039037350									
	Cherwell (Ashby Brook to Cropredy)	Moderate	Good status by 2027	Identified biological impacts						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status element (green = none, amber = possible, red = likely)	N/A	N/A	N/A	N/A	N/A	
	2. Macrophytes and phytobenthos - macrophytes	-	-		No impact on upstream water bodies	Scheme elements present on the River Cherwell and its main tributary, Lower Thorpe Brook, which support frequent aquatic vegetation are identified as having the potential for very localised adverse effects (viaducts) or temporary adverse effects (river diversions) that would be balanced by the creation of new habitats. In addition to a river diversion and a viaduct, smaller tributaries, which are heavily shaded and do not support any aquatic vegetation, are also impacted by several culverts (200 m in total). Given these elements and the relative low contribution of the smaller tributaries (drainage ditches) to the River Cherwell, the overall effect of the scheme on this quality element, which currently does not have a status. is considered to be negligible.	No additional mitigation required	No additional mitigation required	This quality element currently does not have a WFD status. No adverse effect anticipated at the scale of the water body.	
	3. Macroinvertebrates	High	High		No impact on upstream water bodies	Scheme elements present on the River Cherwell and its main tributary, Ashley Brook, are identified as having the potential for very localised adverse effects (viaducts) or temporary adverse effects (river diversion) that would be balanced by the creation of new habitats. In addition to a short river diversion and viaducts, smaller tributaries are also impacted by several culverts (200 m in total). Base flows within the tributary watercourses may be affected by dewatering of two cuttings. Given the relatively low contribution of the smaller tributaries (drainage ditches) to the River Cherwell, their cumulative effect is however likely to be low at the scale of the water body. However, no data is available for the River Cherwell on the impacted stretch. Given the high status of the water body for macroinvertebrates and the potential for minor adverse effects, there is a risk of deterioration of the WFD status for this quality element.	Baseline surveys of tributaries and stretch of main Cherwell water body to be impacted by the scheme to be undertaken prior to construction to establish macroinvertebrate baseline, and monitoring to be undertaken during the construction period.	No additional mitigation required	Risk of deterioration will depend on the outcome of baseline surveys.	-
	4. Fish	Good	Good		No impact on upstream water bodies	Scheme elements present on the River Cherwell and its main tributary, Ashley Brook, are identified as having the potential for very localised adverse effects (viaducts) or temporary adverse effects (river diversion) that would be balanced by the creation of new habitats. The culverts present on the smaller tributaries (drainage ditches) are considered of having the potential for adverse effects, by very locally reducing habitat available to fish and limiting access to potential habitat of interest for fish (spawning). Despite the fact that the River Cherwell supports currently poor fish habitat and communities and that no migratory species were recorded within the area impacted, it is a designated watercourse under the Freshwater Fish Directive. Given the presence of several culverts (200 m in total) on the tributaries, for which no ecology baseline data is available but which are potentially of interest for fish (spawning), the scheme will be considered as having a potential localised adverse effect on this biological element. Given the good status of the fish community and the predicted minor adverse effects, there is a risk of deterioration for this element.	Baseline surveys of tributaries to be undertaken prior to construction to establish fish baseline, and monitoring to be undertaken during the construction period.	No additional mitigation required	Risk of deterioration will depend on the outcome of baseline surveys.	
	Physico-Chemical status									
WFD classification elements	5. Dissolved Oxygen	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	No impact on upstream water bodies	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	No additional mitigation required	No additional mitigation required	Minor and localised effects	-
	6. pH	-	-		No impact on upstream water bodies					
	7. Phosphate	-	-		No impact on upstream water bodies					
	8. Ammonia	-	-		No impact on upstream water bodies					
	9. Temperature	-	-		No impact on upstream water bodies					
	10. Specific Pollutants (Annex VIII)	-	-		No impact on upstream water bodies					
	Hydromorphological status									**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	No impact on upstream water bodies	• The river diversion of the River Cherwell could increase gradients and flow velocities, and the tendency scour of the bed and bank, diversion extends over approximately 100m, but there would actually only be a minor change to channel planform • The channel appears to have an equilibrium, stable form, and the diversion would probably disrupt the natural balance of channel processes. However, further investigation and careful design is required to mitigate any potential impacts • Edgcote Viaduct and Lower Thorpe Viaduct have pillars in the floodplain and therefore may cause impacts to river dynamics at time of flood, however effects likely to be local. • The culverts on the upper reaches are extensive (1 m total), however due to the size of the watercourses and the location of the culverts in the upper reaches, the effect is likely to be local.	• The channel appears to have a natural, equilibrium form, so efforts to engineer new habitats are likely to be counter productive • The scale of the diversion is likely to mean there are no major morphological responses, and only gradual bed and bank scour and deposition downstream would occur, resulting in habitat diversity, so it is likely that the best approach would be to allow the channel space to adjust its form locally • This MUST be investigated in detail: an appropriate level of analysis is beyond the scope of this study • Bank reinforcements would certainly be required on the viaduct side of the channel to maintain the channel course after diversion • It is possible that this could be achieved with soft engineering techniques, but this requires further investigation	Minor and localised effects following mitigation	• Channel meanders within a wide floodplain • Channel is crossed upstream of the proposed viaduct by Welsh Road, and appears to have bank reinforcements for a short distance to prevent scour and undercutting of Edgcote Road. This may well affect floodplain flows. • Map from the mid 1990s show that channel planform has not changed significantly for at least ca. 20 years. • Some palaeo features can be observed from aerial images in floodplain areas, but these are not immediately apparent, possible because of arable agriculture and ploughing. This does indicate though that the channel has migrated 10s of metres across the valley floor historically • Contemporary OS map shows that a Civil parish boundary follows the channel centreline upstream of the site, constituting further evidence that channel planform is stable • Flows may be regulated to a minor degree by partial diversion to 'The Pool', which appears to be an artificial water body at Edgcote House, which appears to be an artificial water body
	12. Connection to Groundwater	-	-		No impact on upstream water bodies					• There are numerous springs on the shallow valley sides, but in the context of the proposed viaduct this is not significant to hydromorphology
	13. River continuity	-	-		No impact on upstream water bodies					• Channel is set in well developed floodplain with good connectivity • Channel is crossed by Welsh Road a short distance upstream, so continuity could be sensitive in this area
	14. River depth and width variation bed	-	-		No impact on upstream water bodies					• Channel width is generally consistent for most of the reach, as would be expected for a meandering channel that regulates its own form • Channel width does vary upstream and downstream of Welsh Road and Edgcote Road, and a small bar or island appears to have formed immediately downstream of the existing crossing. The apparent discontinuity in morphology indicates a channel response to the structures • Bed variations and bed substrate formations cannot be observed from available information
	15. Structure and substrate of river bed	-	-		No impact on upstream water bodies					• Low, small, calcareous RBMP channel type • Channel is developed in alluvium over mudstone. No faults mapped at the site that would suggest an influence on channel form • Channel sediments cannot be determined from available information
	16. Structure of riparian zone	-	-		No impact on upstream water bodies					• Well developed and vegetated. • Good riparian and floodplain connectivity

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen					
NONE	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Impacts from other WFD water bodies (assessed separately) - Multiple scheme elements (Cherwell (Ashby Brook to Cropredy)- GB106039037350)	OVERALL impact on element	Proposed Mitigation Measures		Residual impact	-
	GB106039037310	Poor	Good by 2027	Description of scheme element impact			Construction	Operation		
	Cherwell (Cropredy to Nell Bridge)			Identified biological impacts						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	
	2. Macrophytes and phytobenthos - macrophytes	-	-		Given the distance (3km approximately) with the scheme elements present on the water body GB106039037350 and their very localised potential effects, no effect anticipated on this quality element.	This quality element has not WDF status. The scheme is unlikely to have any significant effect on this quality element, so the achievement of the WFD objectives should not be compromised.	None required.	None required.	No significant impacts predicted	
	3. Macroinvertebrates	Moderate	Good		Given the distance (3km approximately) with the scheme elements present on the water body GB106039037330 and their very localised potential effects, no effect anticipated on this quality element.	The scheme is unlikely to lead to the deterioration of the current WFD status of this element (Moderate) at the water body scale, and the achievement of the WFD objectives (which are fore the status to become Good by 2015) should not be compromised.	None required.	None required.	No significant impacts predicted	-
	4. Fish	Good	Good		Although the distance (3km approximately) with the scheme elements present on the water body GB106039037330 make that no direct effect are anticipated, the presence of culverts on several tributaries of the River Cherwell (WB GB106039037350) could have an adverse effect on this quality element. The watercourse is indeed a Freshwater Fish Directive designated water body. As no data is available for fish for the watercourse, and as design details are not available for the culverts, a potential adverse effect having the potential to deteriorate the status of this element cannot be ruled out.	Scheme elements (culverts) present on the upstream water bodies are identified as having the potential to lead to a deterioration the current WFD status of this element (Good) and therefore the potential to compromise the achievement of the WFD objectives for this quality element (which are for the status to remain Good by 2015)	None required.	- It is important to ensure that the culverts are designed and installed to allow fish passage. An assessment of the culverts with relation to flows and fish passage must be included as part of the detailed design development. - Culverts to be regularly maintained and kept in a functional state that allows fish movements. - Further surveys to assess the value of the upstream watercourses for fish should be undertaken as part of the assessment. Further, construction and post-construction monitoring should be considered (if necessary) to assess any effects on fish migration.	Potential risk to WFD element status.	
	Physico-Chemical status									
WFD classification elements	5. Dissolved Oxygen	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	Given the distance (3km approximately) with the scheme elements present on the water body GB106039037350 and their very localised potential effects, no effect anticipated on this quality element.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are considered temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	No significant impacts predicted	-
	6. pH	-	-							
	7. Phosphate	-	-							
	8. Ammonia	-	-							
	9. Temperature	-	-							
	10. Specific Pollutants (Annex VIII)	-	-							
	Hydromorphological status									**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	Given the distance (ca. 3km) from the scheme elements present on the water body GB106039037350 and the localised potential effects o that water body, no hydromorphological impact anticipated on GB106039037310.	Given the distance from the upstream WFD body which crosses the HS2 scheme (>3km), there are unlikely to be any measurable hydromorphological impacts present.	None required.	None required.	No significant impacts predicted	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-							
	13. River continuity	-	-							
	14. River depth and width variation bed	-	-							
	15. Structure and substrate of river bed	-	-							
	16. Structure of riparian zone	-	-							

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen		-	-	-	-	-	-
Operational and structural changes to locks, sluices, weirs, beach control, etc.	Not in place	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	The scheme elements present on the upstream water body (GB106039037350) do not have the potential to affect the implementation of this mitigation measure. No effect anticipated.	None required.	None required.	No significant effects	-
Structures or other mechanisms in place and managed to enable fish to access waters upstream and downstream of the impounding works.	Not in place	-		-	Scheme elements (culverts) present on the upstream water body (GB106039037350) have the potential to compromise the implementation of this mitigation measure as they constitute obstructions to fish access to upstream watercourses.	None required.	- It is important to ensure that the culverts are designed and installed to allow fish passage. An assessment of the culverts with relation to flows and fish passage must be included as part of the detailed design development. - Culverts to be regularly maintained and kept in a functional state that allows fish movements. - Further surveys to assess the value of the upstream watercourses for fish should be undertaken as part of the assessment. Further, construction and post-construction monitoring should be considered (if necessary) to assess any effects on fish migration.	Potential adverse effect	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Boddington Cutting		Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	-
	GB106039037370	Moderate	Good Ecological Potential by 2027	Description of scheme element impact	Crosses into next GWB: WA SM. S half drains to attenuation pond then Canal Feeder (Ch.114+860). N half drains to attenuation pond then Oxford Canal (Ch. 188+610). Divide in drainage at Ch.116+350.				Construction	Operation		
	Clayton and Wormleighton Brook, Source to Highfurlong Brook			Identified biological impacts	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	-	-		Minor reductions in flow rates may occur. Effects on macrophytes, if they occur would be negligible	No impact identified. No likely effect anticipated.	No upstream water body.	No effect anticipated	None required..	None required..	No effect anticipated	
	3. Macroinvertebrates	-	-		Minor reductions in flow rates may occur. Effects on macroinvertebrates, if they occur would be negligible	No impact identified. No likely effect anticipated.	No upstream water body.	Potential minor and localised effects on element.	None required..	None required..	Potential minor and localised effects on element.	
	4. Fish	-	-		Minor reductions in flow rates may occur. Effects on fish, if they occur would be negligible	No impact identified. No likely effect anticipated.	No upstream water body.	Potential minor and localised effects on element.	None required..	None required..	Potential minor and localised effects on element.	
	Physico-Chemical status											
WFD classification elements	5. Dissolved Oxygen	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation	No impact identified. No likely effect anticipated.	No upstream water body.	Potential minor and localised effects on element.	None required..	None required..	Potential minor and localised effects on element.	-
	6. pH	-	-		Receptor is insensitive to impact	Receptor is insensitive to impact	No upstream water body.	Receptor is insensitive to impact	None required..	None required..	Receptor is insensitive to impact	
	7. Phosphate	-	-		• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution	No impact identified. No likely effect anticipated.	No upstream water body.	Depending on how much flow is lost, potential minor and localised effects on element.	None required..	None required..	Depending on how much flow is lost, potential minor and localised effects on element.	
	8. Ammonia	-	-		• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates	No impact identified. No likely effect anticipated.	No upstream water body.	Potential minor and localised effects on element.	None required..	None required..	Potential minor and localised effects on element.	
	9. Temperature	-	-		Receptor is insensitive to impact	Receptor is insensitive to impact	No upstream water body.	Receptor is insensitive to impact	None required..	None required..	Receptor is insensitive to impact	
	10. Specific Pollutants (Annex VIII)	-	-		• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates	No impact identified. No likely effect anticipated.	No upstream water body.	Potential minor and localised effects on element.	None required..	None required..	Potential minor and localised effects on element.	
	Hydromorphological status											Hydromorphology Baseline
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	Possible minor reductions in flow quantities and dynamics, but the effects are unlikely to have any significant impacts	N/A	No upstream water body.	Possible minor reductions in flows	None required.	None required.	Possible minor reductions in flows	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		The cutting may reduce flow rates to the surface watercourse, but the effects would probably be minimal	N/A	No upstream water body.	Possible minor reductions in connection	None required.	None required.	Possible minor reductions in connection	
	13. River continuity	-	-		Possible minor reductions in flows that could affect hydraulic and sediment regimes, but the effects are unlikely to have any significant impacts	N/A	No upstream water body.	Possible minor reductions in continuity	None required.	None required.	Possible minor reductions in continuity	
	14. River depth and width variation bed	-	-		Possible minor reductions in flows, but impacts on flow widths and depths would be minimal	N/A	No upstream water body.	Possible minor reductions in depths and widths	None required.	None required.	Possible minor reductions in depths and widths	
	15. Structure and substrate of river bed	-	-		Possible minor reductions in flows that could affect sediment transport and deposition, but impacts would be minimal	N/A	No upstream water body.	Possible minor effect on bed composition	None required.	None required.	Possible minor effect on bed composition	
	16. Structure of riparian zone	-	-		No changes to riparian zones are anticipated	N/A	No upstream water body.	No effect anticipated	None required.	None required.	No effect anticipated	

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	-	-	-	-	-	-	-	-
NONE	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Viaduct (footings in or within riparian zone of watercourse)					River Diversion			Cutting		Impacts from other WFD water bodies (assessed separately)	OVERALL impact on element	Proposed Mitigation Measures		Residual impact	-
GB106039042660			Description of scheme element impact	Highfurlong Brook viaduct SWC-CFA15-09- Construction of viaduct 15m in length with 15 to 20m spans approximately 9m in height.					Highfurlong Brook (SWC-CFA15-09) - Channel diversion during construction of Highfurlong Brook Viaduct, receiving discharges from railway via balancing ponds.			Aston le Walls cutting - Approximately 112+000, Lower Boddington cutting - Approximately 113+000				Construction	Operation		
Highfurlong Brook (Source to Wormleighton Brook)	Good	Good Ecological Status by 2015	Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge)	Change in water quality due to discharge of groundwater to a surface water body.						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	-	Good by 2015		Receptor is insensitive to impact. No likely effect anticipated.	There will be no viaduct footings within diverted river channel. The watercourse is heavily shaded and supports very few aquatic vegetation (ecology baseline surveys). No likely effect anticipated.	There may be minor localised changes in the cover and composition of macrophyte communities, due to reduction of photosynthetic activity. The watercourse is heavily shaded and supports very few aquatic vegetation (ecology baseline surveys). Effect considered to be negligible and highly localised.	No significant hydromorphological changes expected. No likely effect anticipated	CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	There will be loss of marginal and channel macrophytes over the 40 m length of the existing Highfurlong Brook that lies within the diverted section. The watercourse is heavily shaded and supports very few aquatic vegetation (ecology baseline surveys). It is anticipated that the macrophyte community will re-establish within 1 to 2 years of completion of the river diversion. Effect considered to be negligible and highly localised.	The new channel will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. The effect on this quality element is considered to be minor beneficial and localised.	Potential increase in flow turbulences, flow velocities and increase in morphology diversity, and possible increase in sediment transport, with no significant effect at the scale of the water body. The watercourse is heavily shaded and supports very few aquatic vegetation (ecology baseline surveys). Effect likely to be negligible and highly localised.	No impact identified. No likely effect anticipated.	No impact identified. No likely effect anticipated.	No upstream water body impacted by the scheme	The river diversion and the viaduct are identified as having negligible effects on the currently poor aquatic vegetation quality of the Highfurlong Brook within the stretch impacted. The element has currently no WFD status. Given the very localised and/or temporary nature of the effects, overall effect is considered not to have the potential to compromise the achievement of the WFD objectives for this element status (Good by 2015).	None required.	None required.	No significant effects	-
	3. Macroinvertebrates	-	Good by 2015		Receptor is insensitive to impact. No likely effect anticipated.	The river diversion should avoid viaduct footings to be within river channel. The watercourse supports poor macroinvertebrate quality (ecology baseline surveys). No likely effect anticipated.	Macroinvertebrate community may be slightly altered due to shading effects on macrophyte communities. However, the watercourse is heavily shaded and supports very few aquatic vegetation and poor macroinvertebrate quality (ecology baseline surveys). Effect considered to be negligible and highly localised.	No significant hydromorphological changes expected. No likely effect anticipated	CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	There will be loss of macroinvertebrates habitat over the 40 m length of the existing Highfurlong Brook that lies within the diverted section. However, the watercourse supports poor macroinvertebrate quality (ecology baseline surveys). Localised and minor adverse effect anticipated.	The river diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach. The watercourse supports poor macroinvertebrate quality (ecology baseline surveys). The effect on this quality element is considered to be minor beneficial and localised.	Potential increase in flow turbulences, flow velocities and increase in morphology diversity, and possible increase in sediment transport, with no significant effect at the scale of the water body. The watercourse supports poor macroinvertebrate quality, and communities adapted to moderate flow velocities and sedimentation (ecology baseline surveys). Effect likely to be negligible to minor beneficial if diversification of habitat associated with hydromorphological changes.	No impact identified. No likely effect anticipated.	No impact identified. No likely effect anticipated.	No upstream water body impacted by the scheme	The viaduct is identified as having negligible effects on the currently low macroinvertebrate quality of the Highfurlong Brook within the stretch impacted. The river diversion is likely to have temporary and localised adverse effect while the new channel re-establishes, but would be balanced in the long term by the creation of new habitats within the new channel. The element has currently no WFD status. Given the very localised nature of the effects, overall effect is considered not to have the potential to compromise the achievement of the WFD objectives for this element status (Good by 2015).	None required.	None required.	No significant effects	
	4. Fish	-	Good by 2015		Receptor is insensitive to impact. No likely effect anticipated.	The river diversion should avoid viaduct footings to be within river channel. The watercourse currently supports poor fish quality and communities characterised by low abundances and diversity (ecology baseline surveys). No likely effect anticipated.	Likely to lead to very localised but permanent reduction of habitat available (i.e. riparian vegetation). The watercourse currently supports poor fish quality and communities characterised by low abundances and diversity (ecology baseline surveys). Effect considered to be negligible and highly localised.	No significant hydromorphological changes expected. No likely effect anticipated	CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	Temporary loss of approximately 40 m of habitats while the new channels re-establish. Fish kills expected while dewatering existing channel. The watercourse currently supports poor fish quality and communities characterised by low abundances and diversity (ecology baseline surveys). Localised adverse effect anticipated.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities. The watercourse currently supports poor fish quality and communities characterised by low abundances and diversity (ecology baseline surveys). The effect is considered to be minor beneficial and localised.	Potential increase in flow turbulences, flow velocities and increase in morphology diversity, and possible increase in sediment transport, with no significant effect at the scale of the water body. The watercourse currently supports poor fish quality and communities characterised by low abundances and diversity (ecology baseline surveys). Effect likely to be negligible to minor beneficial if diversification of habitat associated with hydromorphological changes.	No impact identified. No likely effect anticipated.	No impact identified. No likely effect anticipated.	No upstream water body impacted by the scheme	The viaduct is identified as having negligible effects on the currently low fish quality of the Highfurlong Brook within the stretch impacted. The river diversion is likely to have temporary and localised adverse effect while the new channel re-establishes, but would be balanced in the long term by the creation of new habitats within the new channel. The element has currently no WFD status. Given the very localised nature of the effects, overall effect is considered not to have the potential to compromise the achievement of the WFD objectives for this element status (Good by 2015).	None required.	None required.	No significant effects	-
	Physico-Chemical status																		
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	No impact identified. No likely effect anticipated.	No impact identified. No likely effect anticipated.	No upstream water body impacted by the scheme	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	No significant effects	-
	6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No upstream water body impacted by the scheme					-
	7. Phosphate	Good	-		N/A	N/A	N/A	s an open span bridge, so there would	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	No impact identified. No likely effect anticipated.	No impact identified. No likely effect anticipated.	No upstream water body impacted by the scheme					-
	8. Ammonia	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No impact identified. No likely effect anticipated.	No impact identified. No likely effect anticipated.	No upstream water body impacted by the scheme					-
	9. Temperature	-	-		N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No upstream water body impacted by the scheme					-
	10. Specific Pollutants (Annex VIII)	-	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	No impact identified. No likely effect anticipated.	No impact identified. No likely effect anticipated.	No upstream water body impacted by the scheme					-
	Hydromorphological status																		**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• Crossing is effectively an open span bridge. • It appears that there has been no significant planform change that could mean that the river path adjusts and starts to erode against viaduct footings. The Civil Parish boundary (which has presumably been established for decades) follows the watercourse centreline, and comparison with historic maps also shows that there has been no significant planform changes. • Overall, there would probably be no hydromorphological impact	N/A	N/A	• The extent of new watercourse that would be created, and the possible negative effects of altering existing channel conditions, mean that there would be no significant habitat creation	• The diversion is only minor • There is likely to be significant diversity of flow dynamics in the existing meandered channel • The existing reach is sinuous and the minor diversion appears to align with existing sinuosity • Shortening the meander loop under the viaduct as shown in in Drawing C222-ATK-CV-DGA-020-215500 would result in two sharp river bends in quick succession • This may exacerbate turbulence and recirculation in the immediate vicinity, which could have implications for channel scour and adjustment of channel form • Overall, it is considered that the impacts on flow dynamics are unlikely to be significant to WFD objectives	No impact identified. No likely effect anticipated.	No impact identified. No likely effect anticipated.	No upstream water body impacted by the scheme	• The viaduct would have no significant impact on hydromorphology • The diversion of Highfurlong Brook is only minor but would locally increase the tightness of the channel sinuosity, which may trigger flow recirculation and scour. The watercourse is small and would have low stream power, and it is unlikely that channel planform would be altered to the degree that the channel tries to adjust following diversion, but it is possible that scour protection may be required and this is therefore flagged as a risk	Hydromorphological surveys to be undertaken to aid detailed design development Hydromorphological mitigation should be incorporated into detailed design for the diversion where practicable. Mitigation measures that might be incorporated into the detailed design include: • Appropriate scour protection • Introduce riparian vegetation/green corridors where space allows • Use of engineering techniques to assist natural recovery • Use soft engineering techniques	Minor and localised effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A		N/A	N/A		• Likely to be no significant relationship between hydromorphology and groundwater	No impact identified. No likely effect anticipated.	No impact identified. No likely effect anticipated.	No upstream water body impacted by the scheme					
	13. River continuity	-	-		N/A	N/A	N/A		N/A	N/A		• Shortening the channel may result in accelerated flows beyond the tolerance of local species and could increase sediment transport rates • The extent of the diversion is only minor, and effects would probably only be seen at peak flows • On balance, the effects are likely to be insignificant	No impact identified. No likely effect anticipated.	No impact identified. No likely effect anticipated.	No upstream water body impacted by the scheme					
	14. River depth and width variation bed	-	-		N/A	N/A	N/A		N/A	N/A		• The diversion would only have a minor effect on existing channel geometry • Flow rates may increase in the diverted section, and the nature of the two tight bends means that flow recirculation and vortices could trigger bed scour at peak flows, resulting in a pool at low flows • The likely increase in scour could mean there is a need for scour protection a the viaduct or other channel side assets, which ultimately could mean a greater length of habitats deteriorated • Some local scour and substrate deposition downstream could promote morphological diversity • Overall , this is most likely to promote morphological and habitat diversity, but there is a risk of scour that would need to be managed, so	No impact identified. No likely effect anticipated.	No impact identified. No likely effect anticipated.	No upstream water body impacted by the scheme					
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A		N/A	N/A		• Shortening the channel could locally increase scour in the diverted reach • This could result in loss of substrates in the shortened reach, but increased diversity of bed formations immediately downstream and possibly increased sediment deposition • Overall , this is most likely to promote morphological and habitat diversity, but there is not enough certainty to classify the effects as beneficial	No impact identified. No likely effect anticipated.	No impact identified. No likely effect anticipated.	No upstream water body impacted by the scheme					
	16. Structure of riparian zone	-	-		N/A	N/A	N/A		N/A	N/A		• There is unlikely to be any net change to existing bank, riparian and floodplain structure and connectivity with channel	No impact identified. No likely effect anticipated.	No impact identified. No likely effect anticipated.	No upstream water body impacted by the scheme					

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	**Where RBMP measure will happen**	**When RBMP measure will happen**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NONE identified in RBMP Annex B	-	-	**Predicted change to status elements (green = none, amber = possibly, red = likely)**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Impacts from other WFD water bodies (assessed separately) - Multiple scheme elements (Highfurlong Brook (Wormleighton to Cherwell) - GB106039037330)	OVERALL impact on element	Proposed Mitigation Measures		Residual impact	-
	GB106039037330	Moderate	Good by 2027	Description of scheme element impact			Construction	Operation		
	Highfurlong Brook (Wormleighton to Cherwell)			Identified biological impacts						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	-	-		Given the distance (2km approximately) with the scheme elements present on the water body GB106039037330 and their very localised potential effects, no effect anticipated on this quality element.	No scheme elements are directly present on this water body. Given that there will not be any significant impact from scheme elements present on the upstream water body, the scheme is considered as unlikely to have an effect on this quality element, which has no current WDF status.	None required.	None required.	The scheme is considered as having no effect on this quality element.	-
	3. Macroinvertebrates	Moderate	Good by 2027		Given the distance (2km approximately) with the scheme elements present on the water body GB106039037330 and their very localised potential effects, no effect anticipated on this quality element.	No scheme elements are directly present on this water body. Given that there will not be any significant impact from scheme elements present on the upstream water body, the scheme is considered as unlikely to lead to a deterioration of the current WFD status (Moderate) of this quality element.	None required.	None required.	The scheme is not considered as having the potential to deteriorate of the current WFD status (Moderate) of this quality element.	-
	4. Fish	-	-		Given the distance (2km approximately) with the scheme elements present on the water body GB106039037330, their nature (no culverts) and their very localised potential effects, no effect anticipated on this quality element.	No scheme elements are directly present on this water body. Given that there will not be any significant impact from scheme elements present on the upstream water body, the scheme is considered as unlikely to have an effect on this quality element, which has no current WDF status.	None required.	None required.	The scheme is considered as having no effect on this quality element.	-
	Physico-Chemical status									
WFD classification elements	5. Dissolved Oxygen	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	Given the distance (2km approximately) with the scheme elements present on the water body GB106039037330 and their very localised potential effects, no effect anticipated on this quality element.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are considered temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	N/A	-
	6. pH	-	-							-
	7. Phosphate	-	-							-
	8. Ammonia	-	-							-
	9. Temperature	-	-							-
	10. Specific Pollutants (Annex VIII)	-	-							-
	Hydromorphological status									**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	Given the distance (2km approximately) from the scheme elements present on the water body GB106039037330 and their very localised potential effects, no impacts anticipated on hydromorphology.	No scheme elements are present on this water body. Considering the distance (2km) of the WFD water body where scheme elements are identified, it is unlikely that any measurable hydromorphological impacts will be present.	None required.	None required.	N/A	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-							
	13. River continuity	-	-							
	14. River depth and width variation bed	-	-							
	15. Structure and substrate of river bed	-	-							
	16. Structure of riparian zone	-	-							

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	-	-	-	-	-	-	-
NOT REQUIRED FOR THIS ASSESSMENT	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Culvert - on Boddington Feeder (Oxford Canal)					River Diversion - Boddington Feeder (Oxford Canal)			Culverting and multiple drainage outfalls on two unnamed tributaries of Boddington Feeder (Oxford Canal)					River Diversion - two unnamed tributaries of the Boddington Feeder			Culvert and drainage outfall on Unnamed drain of the Boddington Feeder at Fox Covert				
GB806100002	Good	Good Ecological Potential by 2015	Description of scheme element impact	*Culvert on Boddington Feeder (Oxford Canal) (SWC-CFA15-11). Channel diversion, shortening of watercourse and culverting.*					*Channel diversion of Boddington Feeder (Oxford Canal) (SWC-CFA15-11). Channel diversion, shortening of watercourse and culverting.*			*Culverting and multiple drainage outfalls on two unnamed tributaries of the Boddington Feeder (Oxford Canal) (SWC-CFA15-12).*					*Channel diversion and shortening of watercourse on two unnamed tributaries of the Boddington Feeder (Oxford Canal) (SWC-CFA15-12).*			*New culvert and drainage outfall on unnamed drain of the Boddington Feeder at Fox Covert (SWC-CFA15-13)*				
Boddington Feeder (Oxford Canal)			**Identified biological impacts**	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2. Macrophytes and phytobenthos - macrophytes	-	-		- Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Baseline invertebrate data from the tributary indicate 'poor' to 'fair' invertebrate quality, mostly characterised by tolerant groups, but as this is a short culvert on a minor tributary only minor and localised effects are anticipated.	- Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - No baseline data available, but as this is a short culvert on a minor tributary only minor and localised effects are anticipated.	- Localised changes in flow dynamics may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). -This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- There will be loss of marginal and channel macrophytes over the length of the existing watercourse that lies within the diverted section. - No baseline data are available, but the macrophyte community will re-establish within 1 to 2 years of completion of the diversion. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised and only affect the minor drain.	- The new channel will replicate existing habitat and where possible incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. - The effect on this quality element is considered to be minor positive.	- No hydromorphological effects anticipated on macrophyte communities	Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - No baseline data available, but this are small trib. that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - No baseline data available, but these are small drains that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the extended culvert) may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). - No baseline data available, but this is a small trib. that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- There will be loss of marginal and channel macrophytes over the length of the existing watercourses that lies within the diverted section. - No baseline data are available, but the macrophyte community will re-establish within 1 to 2 years of completion of the river diversion. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised	- The new channel will replicate existing habitat and where possible incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. - Embedded mitigation to include retaining and if possible enhancing the overall quality of the watercourses, for example by including meanders and enhanced banks. - Improvements along watercourse either side of culvert, sufficient to maintain open length and watercourse gradient. -The effect on this quality element is considered to be minor positive.	- No hydromorphological effects anticipated on macrophyte communities	n/a	n/a	n/a	n/a	n/a
	3. Macroinvertebrates	-	-		- Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrate habitats within the culvert. - Baseline data indicate invertebrates of 'Poor' to 'Fair' quality near to the location of the crossing - Only minor and localised effects are anticipated.	- Macroinvertebrate community unlikely to be sensitive to shading effects on macrophyte communities' Baseline data indicate invertebrates of 'Poor' to 'Fair' quality near to the location of the crossing, and this is considered to be neutral.	- Localised changes in flow dynamics may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediate downstream area). -This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- There will be temporary loss of macroinvertebrates and habitat over the length of the existing watercourse that lies within the diverted section. -Baseline data indicate 'Poor' to 'Fair' invertebrate and heavily sedimented invertebrate community, which will require more than 1 year to re establish give the short distance effected. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised and only affect the minor drain.	- The diversion will replicate existing habitat and where possible will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach.	- No hydromorphological effects anticipated on macroinvertebrate communities.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrate habitats within the culvert. - No baseline data available on the tributaries, but these are small drains that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Shading of the channel may be slightly altered due to shading effects on macrophyte communities present. - No baseline data available, but these are small drains that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the extended culvert) may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediate downstream area). - No baseline data available, but these are small drains (tributaries) trib. that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- There will be temporary loss of macroinvertebrates and habitat over the length of the existing watercourse that lies within the diverted section. - No baseline data available but, it is likely that the extension will act as a barrier to fish migration. - Effects will be temporary and localised	- The river diversion will replicate existing habitat and where possible will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach. - Embedded mitigation to include retaining and if possible enhancing the overall quality of the watercourses, for example by including meanders and enhanced banks. -Improvements along watercourse either side of culvert, sufficient to maintain open length and watercourse gradient. NOTE THEIR IS A COMMENT IN CHAPTER 2 AS TO WHETHER THIS IS ACHIEVABLE.	- No hydromorphological effects anticipated on macroinvertebrate communities	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - No baseline data available, but this is a minor tributary of a canal that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Landtake will reduce the availability of fish habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Baseline data indicate that fish in the tributary are only present in low numbers and of common species present. -Only minor, short term and localised effects are anticipated	- Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - No baseline data available, but as this is a short culvert on a minor tributary only minor and localised effects are anticipated.	- Fish locally poor, only minor species present, no migratory species would use the water body (canal feeder). - Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel) likely to be minimal, and it is not likely that the culvert will act as a barrier to fish migration. - Only minor and localised effects are therefore anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- There will be temporary loss of habitat over the length of the existing watercourse that lies within the diverted section. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Baseline data indicate that fish in watercourse at the location of the crossing are poor, only minor species present. - Effects will be temporary and localised.	- The diversion will replicate existing habitat and where possible be designed to include a range of habitats that are suitable for the fish species present The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities.	- No hydromorphological effects anticipated on fish communities	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - No baseline data available, but this is a minor tributary of a canal that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Landtake will reduce the availability of fish habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - No baseline data available, but these are small tributaries of a canal feeder that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Shading will only have negligible or no effects on fish.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel) likely to be minimal as there is already several existing crossings (culverts), the culvert extension will be appropriately sized, and it is not likely that the extension will act as a barrier to fish migration. - No baseline data available, but this is a small tributary of a canal feeder and would therefore not support communities of salmonids or other migratory fish and therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- There will be temporary loss of fish habitat over the length of the existing watercourse that lies within the diverted section. - No fish data available, but it is likely to require less than 1 year to re-establish give the short distance affected. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised	- The river diversion will replicate existing habitat and where possible be designed to include a range of habitats that are suitable for the fish species present The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities. - Embedded mitigation to include retaining and if possible enhancing the overall quality of the watercourses, for example by including meanders and enhanced banks. -Improvements along watercourse either side of culvert, sufficient to maintain open length and watercourse gradient.	- No hydromorphological effects anticipated on fish communities	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - No baseline data available, but this is a minor tributary of a canal that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Landtake will reduce the availability of fish habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - No baseline data available, but this is a small tributary feeder of a canal that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Shading will only have negligible or no effects on fish.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel) likely to be minimal as there is already several existing crossings (culverts), the culvert extension will be appropriately sized, and it is not likely that the extension will act as a barrier to fish migration. - No baseline data available, but this is a small tributary of a canal and would therefore not support communities of salmonids or other migratory fish and therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.

Physico-Chemical status

WFD classification elements	5. Dissolved Oxygen	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor locally, with no degradation of the element status anticipated at the scale of the water body.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	N/A	N/A	Due to the length of the proposed culverts, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor locally, with no degradation of the element status anticipated at the scale of the water body.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
	6. pH	-	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	7. Phosphate	-	-		N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	8. Ammonia	-	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	9. Temperature	-	-		N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culverts, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact
	10. Specific Pollutants (Annex VIII)	-	-		N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.

Hydromorphological status

WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• There could be some diversity of flow dynamics, although unlikely to be significant • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • Boddington Feeder is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	N/A	N/A	• Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics • Boddington Feeder is feeder to the Oxford Canal, and it's course is likely to have been modified. • Proposed realignment would shorten the local channel reach, although the diversion is close to the existing channel course • Shortening the channel could increase gradients and flow velocities, and the tendency for bed and bank scour Flow levels could be increased downstream as the channel gradient levels, which could increase overbank spillage • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of shortening the watercourse still needs to be flagged as a risk	N/A	N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • The two tributaries to Boddington Feeder are effectively drainage ditches within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	N/A	N/A	• Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics • The two unnamed tributaries to Boddington Feeder are minor watercourses, and in practical terms represents a small proportion of the water body • Proposed realignment would shorten the local channel reach, although the diversion is close to the existing channel course • Shortening the channel could increase gradients and flow velocities, and the tendency for bed and bank scour. Flow levels could be increased downstream as the channel gradient levels, which could increase overbank spillage • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of shortening the watercourse still needs to be flagged as a risk	N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • The unnamed drain of the Boddington Feeder is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A
	13. River continuity	-	-		N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A	N/A	N/A	• Shortening the channel may result in accelerated flows and reduced channel storage capacity, which in turn could increase overbank spillage and floodplain connectivity downstream • The size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A	N/A	N/A	• Shortening the channel may result in accelerated flows and reduced channel storage capacity, which in turn could increase overbank spillage and floodplain connectivity downstream • The size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A
	14. River depth and width variation bed	-	-		N/A	N/A	N/A	• The diversion would replicate existing channel geometry. • Increasing flow rates may result in local scour of the bed and banks which would promote morphological diversity and allow the channel to regain a dynamic equilibrium form • Some local scour and substrate deposition would promote morphological diversity • Overall , there is unlikely to be significant channel change	N/A	N/A	N/A	• The diversion would replicate existing channel geometry. • Increasing flow rates may result in local scour of the bed and banks which would promote morphological diversity and allow the channel to regain a dynamic equilibrium form • Some local scour and substrate deposition would promote morphological diversity • Overall , there is unlikely to be significant channel change	N/A	N/A	N/A	• Out-of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A	N/A	N/A	• The diversion would replicate existing channel geometry. • Increasing flow rates may result in local scour of the bed and banks which would promote morphological diversity and allow the channel to regain a dynamic equilibrium form • Some local scour and substrate deposition would promote morphological diversity • Overall , there is unlikely to be significant channel change	N/A	N/A	N/A	• Out-of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour, but bed structure could be homogenised • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	N/A	N/A	• Shortening the channel could increase gradients and sediment transport rates. • This could result in loss of substrates in the shortened reach, but increased diversity of bed formations immediately downstream and possibly increased sediment deposition • The locally increased gradient could trigger bed scour upstream as the channel attempts to smooth its bed gradient • Given the size of the channel there is unlikely to be major adjustment, but this is still a risk	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	N/A	N/A	• Shortening the channel could increase gradients and sediment transport rates. • This could result in loss of substrates in the shortened reach, but increased diversity of bed formations immediately downstream and possibly increased sediment deposition • The locally increased gradient could trigger bed scour upstream as the channel attempts to smooth its bed gradient • Given the size of the channel there is unlikely to be major adjustment, but this is still a risk	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	N/A	N/A	• There is unlikely to be any net change to existing bank, riparian and floodplain structure and connectivity with channel	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	N/A	N/A	• There is unlikely to be any net change to existing bank, riparian and floodplain structure and connectivity with channel	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen																						
NONE in Appendix B in RBMP	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Syphon - Inverted siphon/culvert at unnamed Drain at Lower Boddington					Cutting - Lower Boddington Cutting		Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB806100002	Good	Good Ecological Potential by 2015	Description of scheme element impact	*Inverted siphon/culvert (540m) at unnamed Drain at Lower Boddington (SWC-CFA15-10). Balancing pond and rail drainage ditch and outfall.*					*Potential influence from dewatering at Lower Boddington Cutting.*				Construction	Operation		
Boddington Feeder (Oxford Canal)			Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-
	2. Macrophytes and phytobenthos - macrophytes	-	-		· Receptor is insensitive to impact	· Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the syphon. · No baseline data available from the tributary drain, but this is a small ditch in arable farmland. ·Only minor and localised effects are anticipated.	· Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. · No baseline data available from the tributary drain, but this is a small ditch in arable farmland. The effects of shading will therefore be minimal.	· Localised changes in flow dynamics (potential increased flow and scour due to hydraulic effects of the syphon) may result in changes to macrophyte communities within the immediate vicinity of the syphon (notably in immediate downstream area). · This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in macrophyte quality.	· Possible minor and localised effects due to changes in flow.	· Possible minor and localised effects due to changes in water quality.	None identified.	Only minor and localised effects anticipated, no effect on WFD element	None required.	None required.	Minor and localised effects	-
	3. Macroinvertebrates	-	-		Receptor is insensitive to impact	· Landtake will lead to direct loss of macroinvertebrates and reduce the habitats available for colonisation within the syphon. · No baseline data from the tributary were available but this is a small ditch in arable farmland is already heavily modified. There would only be minor and localised effects on invertebrates, with no effect on the WFD status of this element.	· Possible indirect effects on macroinvertebrates if macrophytes are lost due to shading. · If macrophytes constitute a significant component of invertebrate habitat in this location, their loss due to shading may result in minor and localised impacts on this element.	· Localised changes in flow dynamics may result in changes to macroinvertebrate communities within the immediate vicinity of the syphon (notably in immediate downstream area). · This would only be affect a limited distance of the minor tributary and potential effects are considered to be minor and localised.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change to invertebrate quality.	· Possible minor and localised effects due to changes in flow.	· Possible minor and localised effects due to changes in water quality.	None identified.	Only minor and localised effects anticipated, no effect on WFD element	None required.	None required.		
	4. Fish	-	-		· Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) · No fish data available, but given that this is a small ditch in arable farmland, there is only a limited potential for fish and only minor species are likely to be present Effects are likely to be temporary, minor and highly localised (if any), not affecting the main watercourse.	· Landtake is unlikely to result in direct mortality of fish but there will be direct loss of fish habitats available for colonisation within the syphon. · No fish data available, but given that this is a small ditch in arable farmland there is only a limited potential for fish and only minor species are likely to be present. The loss of habitat will only lead to very minor and localised effects, with no conceivable effects on the water body as a whole. · Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the siphon).	· Possible indirect effects on fish if macrophytes are lost due to shading. If macrophytes constitute a significant component of fish habitat at this location, their loss due to shading may result in minor and localised impacts on this element.	· Localised changes in flow dynamics and the presence of the syphon have the potential to impede upstream passage of any migratory fish. · No fish data available, but given that this is a small ditch in an agricultural field there is only a limited potential for fish and only minor species are likely to be present. The effects of this impact would only be minor and localised, with no likely effect on the fish population of the overall water body.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change to fish.	· Possible minor and localised effects due to changes in flow.	· Possible minor and localised effects due to changes in water quality.	None identified.	Only minor and localised effects anticipated, no effect on WFD element	None required.	None required.		
	Physico-Chemical status															
WFD classification elements	5. Dissolved Oxygen	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	Due to the length of the proposed siphon/culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Limited dewatering required due to shallow cutting. No impact predicted.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	None identified.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	Minor and localised effects	-
	6. pH	-	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Limited dewatering required due to shallow cutting. No impact predicted.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	None identified.					
	7. Phosphate	-	-		N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	Limited dewatering required due to shallow cutting. No impact predicted.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	None identified.					
	8. Ammonia	-	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Limited dewatering required due to shallow cutting. No impact predicted.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	None identified.					
	9. Temperature	-	-		N/A	N/A	Due to the length of the proposed siphon/culvert, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	Limited dewatering required due to shallow cutting. No impact predicted.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	None identified.					
	10. Specific Pollutants (Annex VIII)	-	-		N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Limited dewatering required due to shallow cutting. No impact predicted.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	None identified.					
	Hydromorphological status															**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • The unnamed drain at Lower Boddington is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	• Any reduction in groundwater levels from drainage at the shallow Lower Boddington Cutting is unlikely to significantly impact on the river flows in the Boddington Feeder (a small watercourse) and therefore is unlikely to impact on the hydromorphology of the watercourse.	N/A	None identified.	• Culverting and minor diversions of Boddington Feeder and tributaries are unlikely to significantly impact river flows due to the size of the watercourse. Any impacts on the river are likely to be localised and therefore unlikely to impact on deterioration of water body status. • However, as there are several culverts on the watercourse and potential cumulative effects, this should be flagged as localised effect.	Undertake hydromorphological surveys to aid detailed design development. Hydromorphological mitigation should be incorporated into detailed design where practicable. Mitigation measures that might be incorporated into the detailed design include: • Bank reprofiling (rehabilitation) • Create reed fringes • Creation of shallow margin in front of hard defence • Install silt, sand or gravel traps • Introduce riparian vegetation/green corridors where space allows • Recreate a sinuous river channel (re-meandering) where space allows • Recreation of gravel bars and riffles using permanent and/or temporary bed structures (increase morphological diversity) • Retain marginal vegetation • Use of engineering techniques to assist natural recovery • Use soft engineering techniques	Minor and localised effects	• Hydromorphology baseline data has been obtained from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A		N/A	None identified.				
	13. River continuity	-	-		N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A		N/A	None identified.				
	14. River depth and width variation bed	-	-		N/A	N/A	N/A	• Out-of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A		N/A	None identified.				
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A		N/A	None identified.				
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A		N/A	None identified.				

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen														
NONE in Appendix B in RBMP	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-	

A. Risk screening of potential to cause deterioration of current WFD status

	Surface Water body	Current status	Status objective	Scheme Elements	Oxford Canal Underbridge					Impacts from other WFD water bodies (assessed separately)	OVERALL impact on element	Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	-
	GB70910196			Description of scheme element impact	63m length clear span bridge with footings close to the banks edge							Construction	Operation		
	Oxford Canal, summit pound	Moderate	Good Ecological Potential by 2015	Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	-	-		- Receptor is insensitive to impact.	No footings in watercourse.	- No baseline survey data available. - There may be minor changes in the cover and composition of macrophyte communities, but this is not considered to be greater than a minor localised change.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a significant effect on water quality which would lead to an effect on macrophytes.	None identified	Only minor and localised effects anticipated, no effect on WFD element	None required.	None required.	N/A	-
	3. Macroinvertebrates	-	-		- Receptor is insensitive to impact.	No footings in watercourse.	- Macroinvertebrate community (no baseline data available) may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor.	No anticipated effects, due to insignificant changes in hydromorphological regime.	CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a significant effect on water quality which would lead to an effect on macroinvertebrates.	None identified	Only minor and localised effects anticipated, no effect on WFD element	None required.	None required.	N/A	-
	4. Fish	-	-		- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). - There were no baseline fish surveys, but fish habitat assessment indicated poor fish habitat quality in the canal. - Effects are likely to be temporary and localised.	No footings in watercourse.	- Fish (no baseline data available) may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor.	No anticipated effects, due to insignificant changes in hydromorphological regime.	CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a significant effect on water quality which would lead to an effect on fish.	None identified	Only minor and localised effects anticipated, no effect on WFD element	None required.	None required.	N/A	-
	Physico-Chemical status														
WFD classification elements	5. Dissolved Oxygen	Moderate	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	CoCP measures will control surface waters through the use of temporary drainage and attenuation ponds. Minor impact with negligible effect.	None identified	CoCP measures (Section 16) will be applied to reduce potentially significant effects on water quality during construction to negligible effects. Discharges to the existing environment will be restricted with balancing ponds, which may have an additional benefit of providing some treatment for water quality of the run-off before it is discharged into the environment during operation.	None required.	None required.	N/A	-
	6. pH	High	-		N/A	N/A	N/A	N/A	CoCP measures will control surface waters through the use of temporary drainage and attenuation ponds. Minor impact with negligible effect.	None identified				N/A	-
	7. Phosphate	High	-		N/A	N/A	N/A	N/A	Receptor is insensitive to impact	None identified				N/A	-
	8. Ammonia	High	-		N/A	N/A	N/A	N/A	CoCP measures will control surface waters through the use of temporary drainage and attenuation ponds. Minor impact with negligible effect.	None identified				N/A	-
	9. Temperature	-	-		N/A	N/A	Some slight shading with negligible/no effect.	N/A	Receptor is insensitive to impact	None identified				N/A	-
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	N/A	CoCP measures will control surface waters through the use of temporary drainage and attenuation ponds. Minor impact with negligible effect.	None identified				N/A	-
	Hydromorphological status														**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	None identified	No effects on hydromorphology anticipates, due to insignificant changes in hydromorphological regime.	N/A	N/A	N/A	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	None identified		N/A	N/A		
	13. River continuity	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	None identified		N/A	N/A		
	14. River depth and width variation bed	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	None identified		N/A	N/A		
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	None identified		N/A	N/A		
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	None identified		N/A	N/A		

B. Risk screening of potential to prevent future attainment of good WFD status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	-	-	-	-	-	-	-	-	-	-	-	-
Bank rehabilitation / reprofiling	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	Possible localised effects near to bridge (footings on banks may locally prevent bank profiling)	None required.	None required	N/A	N/A
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	-	-		Some loss of bankside habitat due to construction of viaduct					N/A	N/A	None required.	None required	N/A	N/A
Phased de-watering and other techniques	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	None required.	None required	N/A	N/A
Selective vegetation control regime	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	None required.	None required	N/A	N/A
Appropriate vegetation control technique	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	None required.	None required	N/A	N/A
Appropriate timing (vegetation control)	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	None required.	None required	N/A	N/A
Appropriate techniques (invasive species)	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	None required.	None required	N/A	N/A
Sediment management	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	None required.	None required	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	River Itchen Viaduct					Lower Radbourne North Viaduct					Lower Radbourne South Viaduct				
GB109054044070			Description of scheme element impact	*88m long viaduct over River Itchen with footings close to banks edge - Viaduct 5.5 m above ground and 14.3 m wide (CFA16-SW-005)*					*50m long viaduct over River Itchen, 14.3 m wide and 4.2 m high with footings close to banks edge (CFA16-SW-003)*					*90m long , 14.3 m wide and 7.2 m high viaduct over tributary of R Itchen with footings close to banks edge (CFA16-SW-002)*				
River Itchen - source to confluence with River Stowe	Moderate	Good Ecological Status by 2027	Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
WFD classifiction elements	1.Macrophytes and phytobenthos - diatoms	n/a	n/a	Predicted change to status elements (green = none, amber = possibly, red = likely)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2. Macrophytes and phytobenthos - macrophytes	-	-		Receptor is insensitive to impact	No footings in watercourse, no loss of macrophyte habitat	Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. There are no macrophyte data available, but there would only be a localised and minor effects on macrophyte communities, not affecting the status of this quality element.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	No footings in watercourse, no loss of macrophyte habitat	Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. There are no macrophyte data available, but there would only be a localised and minor effects on macrophyte communities, not affecting the status of this quality element.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	No footings in watercourse, no loss of macrophyte habitat	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. -There are no macrophyte data available, but there would only be a localised and minor effects on macrophyte communities, not affecting the status of this quality element.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
	3. Macroinvertebrates	High			Receptor is insensitive to impact	No footings in watercourse, no loss of habitat	- Shading may have indirect effects on macroinvertebrates (if macrophyte cover is lost) - the invertebrate community is diverse and sensitive to water quality impacts, but for shading the overall effect is likely to be of negligible and highly localised, with no anticipated effects on the wider water body.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	No footings in watercourse, no loss of habitat	- Shading may have indirect effects on macroinvertebrates (if macrophyte cover is lost) - the baseline data suggest that the invertebrate community is locally of low quality, 'stressed' and not highly sensitive - the overall effect is likely to be of negligible magnitude and highly localised, with no anticipated effects on the wider water body.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	No footings in watercourse, no loss of habitat	- Shading may have indirect effects on macroinvertebrates (if macrophyte cover is lost) - the baseline data suggest that the invertebrate community is locally of low quality, 'stressed' and not highly sensitive - overall effect is likely to be of negligible magnitude and highly localised, with no anticipated effects on the wider water body.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
	4. Fish	-	-		Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). However, effects are likely to be temporary and localised with no impact on the water body as a whole or designated salmonid fishery	No footings in watercourse, no loss of habitat	Shading will only have negligible or no effects on fish.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) Effects are likely to be temporary and localised with no impact on the water body as a whole or designated salmonid fishery	No footings in watercourse, no loss of habitat	Shading will only have negligible or no effects on fish.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) Effects are likely to be temporary and localised with no impact on the water body as a whole or designated salmonid fishery	No footings in watercourse, no loss of habitat	Shading will only have negligible or no effects on fish.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.
	Physico-Chemical status																	
WFD classifiction elements	5. Dissolved Oxygen	Poor	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.
	6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact
	7. Phosphate	Moderate	-		N/A	N/A	N/A	ctively an open span bridge, so there would be no	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	N/A	N/A	ectively an open span bridge, so there would be no	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	N/A	N/A	tively an open span bridge, so there would be	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.
	8. Ammonia	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact
	9. Temperature	-	-		N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.
	Hydromorphological status																	
WFD classifiction elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A
	13. River continuity	-	-		N/A	N/A	N/A	• Crossing design means there will be no footings in the watercourse • Footings in riparian zones or floodplains would not interrupt continuity • The crossing is near the existing A425 crossing, but the new viaduct would be unlikely to result in a significant cumulative impact	N/A	N/A	N/A	N/A	• Crossing design means there will be no footings in the watercourse • Footings in riparian zones or floodplains would not interrupt continuity • Embankments set back from the channel could reduce floodplain connectivity at extreme flows, but this is unlikely to be significant	N/A	N/A	N/A	N/A	• Crossing design means there will be no footings in the watercourse • Footings in riparian zones or floodplains would not interrupt continuity • Embankments set back from the channel could reduce floodplain connectivity at extreme flows, but this is unlikely to be significant	N/A
	14. River depth and width variation bed	-	-		N/A	N/A	N/A	• Crossing design means there will be no footings in the watercourse • The existing 'S' bend at the location of the crossing is unexplained with currently available data. There has been no significant channel planform change in the order of decades, so channel movement toward the footings is considered to be unlikely, but the unexplained channel shape is a risk.	N/A	N/A	N/A	N/A	• Crossing design means there will be no footings in the watercourse and no impact on river width and depth • Historic maps show that planform has not changed significantly in the order of decades, so there is not considered to be significant risk of channel migration towards bridge piers	N/A	N/A	N/A	N/A	• Crossing design means there will be no footings in the watercourse and no impact on river width and depth • Historic maps show that planform has not changed significantly in the order of decades, so there is not considered to be significant risk of channel migration towards bridge piers	N/A
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• Crossing design is effectively an open span bridge , so there would be no impact on the channel bed	N/A	N/A	N/A	N/A	• Crossing design is effectively an open span bridge , so there would be no impact on the channel bed	N/A	N/A	N/A	N/A	• Crossing design is effectively an open span bridge , so there would be no impact on the channel bed	N/A
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	• Footings in the riparian zones would require minor land take but not considered to be significant	N/A	N/A	N/A	N/A	• Footings in the riparian zones would require minor land take but not considered to be significant	N/A	N/A	N/A	N/A	• Footings in the riparian zones would require minor land take but not considered to be significant	N/A

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen																
NONE in Appendix B of RBMP	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Culvert 122-S1					Impacts from other WFD water bodies (assessed separately)	OVERALL impact on element	Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB109054044070		Good Ecological Status by 2027	Description of scheme element impact	*4.0m x 1.5m box culvert on tributary of River Itchen. Length roughly 50m. Located within the Ladbroke Embankment. (CFA16-SW-004)*							Construction	Operation		
River Itchen - source to confluence with River Stowe	Moderate		Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	n/a	n/a	Predicted change to status elements (green = none, amber = possibly, red = likely)	n/a	n/a	n/a	n/a	n/a	No upstream water body	n/a	n/a	n/a	n/a
	2. Macrophytes and phytobenthos - macrophytes	-	-		Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert (no macrophyte data available). - However, only 50 m of a minor tributary of the Itchen will be affected and there would be no conceivable effect on this element at a water body level. - Embedded mitigation measures that are proposed will reduce most effects on this element (notably improvements along watercourse either side of the culvert).	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - There are no macrophyte data available, but there would only be a localised and minor effects on macrophyte communities, not affecting the status of this quality element.	- Localised changes in flow dynamics (potential increased flow due to the straightened channel in the culvert) may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediately downstream). - This would only be effect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	No upstream water body	- The River Itchen does not currently have a WFD status for macrophytes and is not known to be monitored for this element - No data were collected on macrophytes within the River Itchen as part of the baseline survey. - Although the scheme will lead to loss of habitat and photosynthetic activity (in shaded areas) these area relatively minor within the context of the River Itchen water body and embedded included as part of the scheme will mitigate for the minor localised deteriorations identified. - The overall effect is likely to be neutral or have a minor and highly localised adverse effect, not affecting overall status.	No additional mitigation required	- Measures to mitigate any adverse effects form part of the embedded mitigation measures described previously. - For the culvert on the River Itchen tributary, further surveys to assess fish habitat and populations in upstream areas will be undertaken. An assessment of the culvert with relation to flows and fish passage must be included as part of the detailed design development. Based on the findings, the culvert will be designed to avoid/reduce effects on fish (minimal loss of habitat/habitat replacement, no effect on upstream migration etc.) and agreed with the Environment Agency. Consideration will be given for structures/culvert designs that have minimal impacts (e.g. open arch culvert) - Further, construction and post-construction monitoring should be considered (if necessary) to assess any effects on fish migration.	- The overall effect is likely to be neutral or have a minor and highly localised adverse effect, not affecting overall status.	
	3. Macroinvertebrates	High	-		Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrates and reduce the habitats available for colonisation within the culvert. - There are no data on macroinvertebrates in this tributary, but given the relative contribution of this minor tributary of the Itchen there would be no conceivable effect on this element at a water body level. - Embedded mitigation measures that are proposed will reduce some of the adverse effects on this element (notably improvements along watercourse either side of the culvert). - It is important that the culvert is positioned so that natural habitat substrate can deposit.	Shading may have indirect effects on macroinvertebrates (if macrophyte cover is lost). - These are likely to be negligible and given the relative importance of this small tributary of the River Itchen, with no anticipated effects on the wider water body.	- Localised changes in flow dynamics (potential increased flow due to the straightened channel in the culvert) may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediately downstream). - This would only be effect a limited distance of the minor tributary and potential effects are considered to be minimal.	Grainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	No upstream water body	- The River Itchen is currently of High status for macroinvertebrates. This is supported by the baseline data, although there is some variability within the different areas of the stream and small tributaries. - Although the scheme will lead to loss of habitat this is relatively minor within the context of the River Itchen water body and embedded included as part of the scheme will mitigate for the minor localised deteriorations identified. - The overall effect is likely to be neutral or have a minor and highly localised adverse effect, not affecting overall status.			- The overall effect is likely to be neutral or have a minor and highly localised adverse effect, not affecting overall status.	-
	4. Fish	-	-		- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) -Effects are likely to be temporary and localised with no impact on the water body as a whole or designated salmonid fishery	- Landtake is unlikely to result in direct mortality of fish but there will be direct loss of fish habitats available for colonisation within the culvert. - There are no data on fish or fish habitat in this tributary, but the nearby River Itchen is not of significant importance to fish. - Embedded mitigation measures that are proposed will reduce some of the adverse effects on this element (notably improvements along watercourse either side of the culvert). - It is important that the culvert is positioned so that natural habitat substrate can deposit.	Shading will only have negligible or no effects on fish.	- Localised changes in flow dynamics (potential increased flow due to the straightened channel in the culvert) and the presence of the culvert have the potential to impede upstream passage of any migratory fish. There is very limited information on the design of the culvert and no data are available for fish on this tributary - However, given that the tributary forms part of a salmonid river and thus may have important habitats for and support migratory fish and thus there are possible effects on the fish quality element of the overall River Itchen water body, based on a precautionary approach due to the absence of sufficient baseline data - Therefore, it is essential that mitigation measures are considered so that the culvert is designed and positioned so to allow for fish passage.	Grainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	No upstream water body	- The River Itchen does not currently have a WFD status for fish and is not known to be monitored for this element. - Itchen is a designated salmonid river, although no salmonid species were identified during the baseline survey. - The will lead to the loss of habitat and there is the potential for barriers to salmonid fish migration from proposed culverting of a tributary of the Itchen. - The overall effect has the potential to lead to a deterioration in status of fish at the level of the water body, if not mitigated.			- The mitigation measures proposed (notably the design of the culvert to allow for fish passage) will mitigate for the potential deterioriations identified. - The overall effect is likely to be neutral or have a minor and highly localised adverse effect, not affecting overall status.	
Physico-Chemical status														
WFD classification elements	5. Dissolved Oxygen	Poor	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	Due to the length of the proposed culverts, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	No upstream water body	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	No additional mitigation required	No additional mitigation required	No significant impacts predicted	-
	6. pH	High	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No upstream water body				
	7. Phosphate	Moderate	-		N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	No upstream water body				
	8. Ammonia	High	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No upstream water body				
	9. Temperature	-	-		N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	No upstream water body				
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	No upstream water body				
Hydromorphological status														**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • Feature is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	No upstream water body	• Viaducts would have no significant impacts • It is fully acknowledged that the culvert would be detrimental to a minor watercourse, but this is unlikely to be significant at water body scale. The size of the culvert relative to the watercourse would minimise any effects on hydromorphology. Continuity of hydromorphology and physical habitats would be negatively affected, but the crossing is near the upstream end of a first order stream so only a very minor extent of open watercourse habitats would cut-off from the rest of the water body. Mitigation measures such as creation of compensation habitats (e.g. reprofiling the channel banks to create a small wetlands) would also help to offset the impacts of the culvert. An open span bridge crossing would not be cost proportionate and may not be technically feasible because of the embankment.	No additional mitigation is required for viaducts Undertake hydromorphological surveys to aid detailed design Incorporate hydromorphological measures into detailed design where practicable. Mitigation measures may include: • Create compensation habitats • Bank reprofiling (rehabilitation) • Introduce riparian vegetation/green corridors where space allows • Use soft engineering techniques	Minor and localised effects	• Hydromorphology baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	No upstream water body				
	13. River continuity	-	-		N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever any existing habitat continuity, but this is a minor feature and in practical terms would not impact on deterioration of water body status	N/A	No upstream water body				
	14. River depth and width variation bed	-	-		N/A	N/A	N/A	• Channel water surface at the crossing location is not wide enough to visible or measurable from aerial imagery, so there is unlikely to be significant diversity of river depth and width, despite minor sinuosity.	N/A	No upstream water body				
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• Channel water surface at the crossing location is not wide enough to visible or measurable from aerial imagery, so there is unlikely to be significant bed substrate transport or scour. • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	No upstream water body				
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	• The culvert would disconnect the channel from the existing, well developed, mature vegetation riparian zone and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms would not impact on deterioration of water body status	N/A	No upstream water body				

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen											
NONE in Appendix B of RBMP	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	-	-	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Cutting		Impacts from other WFD water bodies- multiple scheme elements (GB109054044070 - R Itchen - source to conf with R Stowe)	OVERALL impact on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	-
	GB109054044110	Poor	Good Ecological Status by 2027	Description of scheme element impact	River Itchen: Southam cutting (125+500 approximately)				Construction	Operation		
	River Itchen - confluence River Stowe to confluence River Leam			Identified biological impacts	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	Poor	Good by 2027	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	Poor	Good by 2027		No significant changes in flows expected. No likely effect anticipated on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.	Scheme elements present on the water body GB109054044070 were identified as having only very localised effects (viaducts, culvert) on this quality element. Given the distance between these scheme elements and the River Itchen, no effect is anticipated at the scale of the water body.	The River Itchen and its tributaries are not directly crossed by the scheme within this water body, and the cutting is identified as having no significant effect on the River Itchen. In addition, scheme elements present on the upstream water body GB109054044070 are identified as having no direct effect on this scheme element. Therefore, the scheme is not considered as having the potential to lead to a deterioration of the current WFD status (Good) of this quality element.	None required.	None required.	The scheme is not considered as having the potential to lead to a deterioration of the current WFD status (Good) of this quality element.	
	3. Macroinvertebrates	Good	Good		No significant changes in flows expected. No likely effect anticipated on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.	Scheme elements present on the water body GB109054044070 were identified as having only very localised effects (viaducts, culvert) on this quality element. Given the distance between these scheme elements and the River Itchen, no effect is anticipated at the scale of the water body.	The River Itchen and its tributaries are not directly crossed by the scheme within this water body, and the cutting is identified as having no significant effect on the River Itchen. In addition, scheme elements present on the upstream water body GB109054044070 are identified as having no direct effect on this scheme element. Therefore, the scheme is not considered as having the potential to lead to a deterioration of the current WFD status (Good) of this quality element.	None required.	None required.	The scheme is not considered as having the potential to lead to a deterioration of the current WFD status (Good) of this quality element.	
	4. Fish	Good	Good		No significant changes in flows expected. No likely effect anticipated on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.	Scheme elements present on the water body GB109054044070 were identified as having very localised effects (viaducts), although a culvert present on a tributary of the River Itchen could constitute a barrier to fish migration. As the River Itchen is a salmonid designated fishery (Freshwater Fish Directive) and as no baseline data on fish is available for the River Itchen, a potential adverse effect is anticipated. However, as the culvert on the tributary is located approximately 8 km upstream of the water body, and as it appears to be a drainage ditch, a minor and localised effect only is anticipated, not affecting this watercourse.	The River Itchen and its tributaries are not directly crossed by the scheme within this water body, and the cutting is identified as having no significant effect on the River Itchen. In addition, one scheme element present on the upstream water body GB109054044070 (culvert on a minor tributary of the River Itchen) is identified as having the potential of a minor adverse effect on this quality element. Therefore, the scheme is not considered as having the potential to lead to a deterioration of the current WFD status (Good) of this quality element.	None required.	None required.	The scheme is not considered as having the potential to lead to a deterioration of the current WFD status (Good) of this quality element.	
	Physico-Chemical status											
WFD classification elements	5. Dissolved Oxygen	Moderate	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	No significant changes in flows expected. No likely effect anticipated on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	No significant effects	-
	6. pH	High	-		No significant changes in flows expected. No likely effect anticipated on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.						
	7. Phosphate	Poor	-		No significant changes in flows expected. No likely effect anticipated on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.						
	8. Ammonia	High	-		No significant changes in flows expected. No likely effect anticipated on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.						
	9. Temperature	-	-		No significant changes in flows expected. No likely effect anticipated on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.						
	10. Specific Pollutants (Annex VIII)	High	-		No significant changes in flows expected. No likely effect anticipated on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.						
	Hydromorphological status											**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	No significant changes in flows expected. No likely effect anticipated on this quality element.		• Given the degree of hydromorphological impacts at water body scale upstream, it is highly unlikely that hydromorphological effects would cascade to connecting water bodies, especially if mitigation measures are put in place 'at source'.	• Given the degree of hydromorphological impacts at water body scale upstream, it is highly unlikely that hydromorphological effects would cascade to connecting water bodies, especially if mitigation measures are put in place 'at source'.	None required.	None required.	No significant effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		No significant changes in flows expected. No likely effect anticipated on this quality element.							
	13. River continuity	-	-		No significant changes in flows expected. No likely effect anticipated on this quality element.							
	14. River depth and width variation bed	-	-		No significant changes in flows expected. No likely effect anticipated on this quality element.							
	15. Structure and substrate of river bed	-	-		No significant changes in flows expected. No likely effect anticipated on this quality element.							
	16. Structure of riparian zone	-	-		No significant changes in flows expected. No likely effect anticipated on this quality element.							

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	-	-	-	-	-	-	-	-
NOT REQUIRED FOR THIS ASSESSMENT	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Viaduct - Longhole Viaduct (footings in or within riparian zone of watercourse)					Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	Baseline data
	GB70910511	Good	Good Ecological Potential by 2015	Description of scheme element impact	Longhole Viaduct over Grand Union Canal at Longhole Bridge (CFA17-SWC-008). Realigned Welsh Road highways drainage to outfall to Grand Union Canal via pipe. Drainage outfalls from railway and Welsh Road realignment.							Construction	Operation		
	Grand Union Canal, Braunston to Leamington Spa			Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	-	-	-	-
	2. Macrophytes and phytobenthos - macrophytes	-	-		- Receptor is insensitive to impact.	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats.	- No baseline survey data available. - There may be minor changes in the cover and composition of macrophyte communities, but this is not considered to be greater than a minor localised change.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	None identified.	Only minor and localised effects anticipated, no effect on WFD element	None required.	None required.	Minor and localised effects	-
	3. Macroinvertebrates	-	-		- Receptor is insensitive to impact.	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats which may be important for macroinvertebrates.	- Macroinvertebrate community (no baseline data available) may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	None identified.	Only minor and localised effects anticipated, no effect on WFD element	None required.	None required.		
	4. Fish	-	-		- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). - There were no baseline fish surveys, but fish habitat assessment indicated poor fish habitat quality in the canal. - Effects are likely to be temporary and localised.	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats.	- Fish (no baseline data available) may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	None identified.	Only minor and localised effects anticipated, no effect on WFD element	None required.	None required.		
	Physico-Chemical status														
WFD classification elements	5. Dissolved Oxygen	Good	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	None identified.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	No significant effects	-
	6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	None identified.					
	7. Phosphate	High	-		N/A	N/A	N/A	ffectively an open span bridge, so there would be no	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	None identified.					
	8. Ammonia	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	None identified.					
	9. Temperature	-	-		N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	None identified.					
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	None identified.					
	Hydromorphological status														**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	N/A	No effects on hydromorphology anticipates, due to insignificant changes in hydromorphological regime.	N/A	N/A	No significant effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	N/A		N/A	N/A		
	13. River continuity	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	N/A		N/A	N/A		
	14. River depth and width variation bed	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	N/A		N/A	N/A		
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	N/A		N/A	N/A		
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	N/A		N/A	N/A		

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	-	-	-	-	-	-	-	-	-	-	-	-
Manage disturbance	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	There will be disturbance during construction although this will be minimised through CoCP measures.	N/A	N/A	N/A	N/A
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	-	-		Some loss of bankside habitat due to construction of viaduct					None identified.	Some loss of bankside habitat due to construction of viaduct , although there will be enhancements associated with the diversion.	None required.	None required.	N/A	N/A
Avoid the need to dredge (e.g. minimise under-keel clearance; use fluid mud navigation; flow manipulation or training works)	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated.	N/A	N/A	N/A	N/A
Prepare a dredging / disposal strategy	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated.	N/A	N/A	N/A	N/A
Reduce impact of dredging	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated.	N/A	N/A	N/A	N/A
Reduce sediment resuspension	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated.	N/A	N/A	N/A	N/A
Alter timing of dredging / disposal	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated.	N/A	N/A	N/A	N/A
Bank rehabilitation / reprofiling	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated.	N/A	N/A	N/A	N/A
Site selection (dredged material disposal) (e.g. avoid sensitive sites)	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated.	N/A	N/A	N/A	N/A
Awareness raising / information boards (boat wash / sources of fine sediment)	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated.	N/A	N/A	N/A	N/A
Phased de-watering and other techniques	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated.	N/A	N/A	N/A	N/A
Selective vegetation control regime	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated.	N/A	N/A	N/A	N/A
Appropriate vegetation control technique	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated.	N/A	N/A	N/A	N/A
Appropriate timing (vegetation control)	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated.	N/A	N/A	N/A	N/A
Appropriate techniques (invasive species)	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated.	N/A	N/A	N/A	N/A
Modify vessel design	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated.	N/A	N/A	N/A	N/A
Vessel Management	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated.	N/A	N/A	N/A	N/A
Sediment management	-	-		N/A	N/A	N/A	N/A	N/A	N/A	No effect anticipated.	N/A	N/A	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Viaduct (clear span)					River Diversion			Culvert				
	GB109054044140	Poor	Good Ecological Status by 2027	Description of scheme element impact	River Leam: 133-L1 - River Leam viaduct - CFA17-SW-011 (133+800)					Tributary of River Leam: CFA17-SW-007 - realignment to avoid Longhole viaduct abutment (129+600 approximately)			Tributary of the River Leam: Ash Beds culvert - CFA17-SW-010 (132+650) - 75 m to 100 m culvert				
	River Leam - confluence River Itchen to confluence River Avon			Identified biological impacts	Vibration leading to disturbance	Landtake (for bridge footings) leading to loss of habitat and reduced connectivity	Shading leading to loss of habitats/sensitive vegetation	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Run off from bridge span resulting in changes to water quality	Landtake	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Creation of new habitats	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	Poor	Good by 2027	Predicted change to status elements (green = none, amber = possibly, red = likely)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	2. Macrophytes and phytobenthos - macrophytes	-	-		Receptor not sensitive to impact. No likely effect anticipated.	No footings within watercourse. No likely effect anticipated.	Very localised but permanent loss of macrophytes due to reduction in photosynthetic activity. The River Leam currently supports abundant macrophyte communities (HS2 baseline surveys). Very localised adverse effect anticipated.	No likely effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect macrophytes.	Temporary loss of habitats of the existing tributary of the River Leam that lie within the diverted section while the new channels re-establish. No baseline data available for the tributary, but aerial photographs suggest that it is an heavily modified and minor tributary (ES Ecology Volume 5). Effect on macrophytes likely to be very localised and negligible at the scale of the water body.	Potential reduction in flow rates with no significant effect at the scale of the water body. No baseline data available for the tributary, but aerial photographs suggest that it is an heavily modified and minor tributary (ES Ecology Volume 5). Effect on macrophytes likely to be very localised and negligible at the scale of the water body.	The realigned channel will incorporate meanders and natural banks (ES Ecology Chapter Volume 2). No baseline data available for the tributary, but aerial photographs suggest that it is an heavily modified and minor tributary (ES Ecology Volume 5). Therefore, new design is likely to constitute an improvement in habitat available to macrophytes. Localised beneficial effect anticipated.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to a localised (100 m max) but permanent loss of habitat. The tributary is locally heavily shaded by riparian vegetation and does not support any aquatic vegetation (HS2 baseline surveys). Effects on macrophytes are likely to be negligible.	Potential modification of macrophytes communities, due to reduction in photosynthetic activity. The tributary is locally heavily shaded by riparian vegetation and does not support any aquatic vegetation (HS2 baseline surveys). Effects on macrophytes are likely to be negligible.	Potential homogenised flow patterns and increase in flow velocities, with no effect at the scale of the water body. The tributary is locally heavily shaded by riparian vegetation and does not support any aquatic vegetation (HS2 baseline surveys). Effects on macrophytes are likely to be negligible.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect macrophytes.
	3. Macroinvertebrates	Good	Good		Receptor not sensitive to impact. No likely effect anticipated.	No footings within watercourse. No likely effect anticipated.	Shade increase likely to lead to localised but permanent loss of potential macroinvertebrate habitats (i.e. macrophytes and riparian vegetation). Abundant aquatic vegetation present locally. Moderate macroinvertebrate quality within the stretch impacted (HS2 baseline surveys). Very localised adverse effect anticipated.	No likely effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect macroinvertebrates.	Temporary loss of habitats of the existing tributary of the River Leam that lie within the diverted section while the new channels re-establish. No baseline data available for the tributary, but aerial photographs suggest that it is an heavily modified and minor tributary (ES Ecology Volume 5). Effect on this quality element likely to be very localised and negligible at the scale of the water body.	Potential reduction in flow rates with no significant effect at the scale of the water body. No baseline data available for the tributary, but aerial photographs suggest that it is an heavily modified and minor tributary (ES Ecology Volume 5). Effect on this quality element likely to be very localised and negligible at the scale of the water body.	The realigned channel will incorporate meanders and natural banks (ES Ecology Chapter Volume 2). No baseline data available for the tributary, but aerial photographs suggest that it is an heavily modified and minor tributary (ES Ecology Volume 5). Therefore, new design is likely to constitute an improvement in habitat available to macroinvertebrates. Localised beneficial effect anticipated.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to localised (100 m max) but permanent loss of macroinvertebrate habitat (i.e. substrate, riparian vegetation). Macroinvertebrate quality of tributary currently poor to moderate within the stretch impacted (HS2 baseline surveys). Effect likely to be localised and minor.	No additional effect anticipated (loss of habitat already included in the landtake impact).	Potential homogenised flow patterns and increase in flow velocities, with no effect at the scale of the water body. Macroinvertebrate quality of tributary currently poor to moderate within the stretch impacted (HS2 baseline surveys). Effect likely to be localised and minor, with no degradation of the element status anticipated at the scale of the water body.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect macroinvertebrates.
	4. Fish	Good	Good		Localised and temporary adverse effect during construction. No deterioration of the water body status of the element is however expected.	No footings within watercourse. No likely effect anticipated.	Shade increase likely to lead to localised but permanent loss of fish habitats (i.e. riparian vegetation, marginal aquatic macrophytes). Abundant aquatic vegetation present locally. The River Leam supports high fish species diversity, including pike and lamprey (HS2 baseline surveys). Very localised adverse effect anticipated.	No likely effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect fish.	Temporary loss of habitats of the existing tributary of the River Leam that lie within the diverted section while the new channels re-establish. No baseline data available for the tributary, but aerial photographs suggest that it is an heavily modified and minor tributary (ES Ecology Volume 5). Fish kills possible while dewatering. Effect on this quality element likely to be very localised and negligible at the scale of the water body.	Potential reduction in flow rates with no significant effect at the scale of the water body. No baseline data available for the tributary, but aerial photographs suggest that it is an heavily modified and minor tributary (ES Ecology Volume 5). Fish kills possible while dewatering. Effect on this quality element likely to be very localised and negligible at the scale of the water body.	The realigned channel will incorporate meanders and natural banks (ES Ecology Chapter Volume 2). No baseline data available for the tributary, but aerial photographs suggest that it is an heavily modified and minor tributary (ES Ecology Volume 5). Therefore, new design is likely to constitute an improvement in habitat available to fish. Localised beneficial effect anticipated.	Localised and temporary adverse effect during construction. No deterioration of the water body status of the element is however expected	Likely to lead to localised (100 m max) but permanent loss of fish habitat and reduced connectivity to the River Leam, as the culvert has the potential to constitute a barrier to fish passage. The River Leam currently supports high fish species diversity, including pike and lamprey and is a Freshwater Fish Directive designated watercourse (HS2 baseline surveys). However, although no fish data are available for the tributary, it is considered as being of poor spawning habitat quality for salmonid fish. Therefore, the effect of the culvert on this quality element will be considered as localised and minor adverse.	No additional effect anticipated (loss of vegetation already included in the landtake impact).	Potential homogenised flow patterns and increase in flow velocities, with no effect at the scale of the water body. The River Leam currently supports high fish species diversity, including pike and lamprey and is a Freshwater Fish Directive designated watercourse (HS2 baseline surveys). However, although no fish data is available for the tributary, it is considered as being of poor spawning habitat quality for salmonid fish. Therefore, the effect of the culvert on this quality element will be considered as locally adverse, with no effect at the scale of the water body.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect fish.

Physico-Chemical status

WFD classification elements	5. Dissolved Oxygen	High		Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor locally, with no degradation of the element status anticipated at the scale of the water body.	N/A	N/A	Due to the length of the proposed culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
	6. pH	High			N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	7. Phosphate	Moderate			N/A	N/A	N/A	ffectively an open span bridge, so there would be no i	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact
	8. Ammonia	High			N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	9. Temperature	-	-		N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact
	10. Specific Pollutants (Annex VIII)	High			N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.

Hydromorphological status

WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	N/A	• Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics • The watercourse is a minor tributary of the River Leam, and in practical terms represents a small proportion of the water body • Lengthening the channel may reduce flow rates although the diversion is not far from the existing channel course • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of lengthening the watercourse still needs to be flagged as a risk	• The extent of new watercourse that would be created, and the possible negative effects of altering existing channel conditions, mean that there would be no significant habitat creation	N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • The minor tributary of the River Leam is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A
	12. Connection to Groundwater	-	-		N/A	N/A	N/A		N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A
	13. River continuity	-	-		N/A	N/A	N/A		N/A	N/A	• Lengthening the channel may result in increased channel storage and reduced floodplain connectivity, but the size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected		N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A
	14. River depth and width variation bed	-	-		N/A	N/A	N/A		N/A	N/A	• The diversion would replicate existing channel geometry. Out of channel flow depths may decrease as a result of lengthening the channel, but in practical terms there would be no significant change		N/A	N/A	N/A	• Out-of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A		N/A	N/A	• Lengthening a channel tends to reduce flow rates and increase deposition of sediment • Given the size of the watercourse there would probably be no measurable impact		N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A
	16. Structure of riparian zone	-	-		N/A	N/A	N/A		N/A	N/A	• Although channel capacity would increase, there is likely to be no net change to existing bank, riparian and floodplain structure and connectivity with channel		N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen													
NOT REQUIRED FOR THE ASSESSMENT OF THIS WATER BODY	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Cutting		Impacts from other WFD water bodies- multiple scheme elements (GB109054044110 - R Itchen - conf R Stowe to conf R Leam)	OVERALL impact on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
	GB109054044140	Poor	Good Ecological Status by 2027	Description of scheme element impact	River Itchen: Offchurch cutting (132+000 approximately), Ash beds cutting (135+000 approximately)				Construction	Operation		
	River Leam - confluence River Itchen to confluence River Avon			Identified biological impacts	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	Poor	Good by 2027	Predicted change to status elements (green = none, amber = possibly, red = likely)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
	2. Macrophytes and phytobenthos - macrophytes	-	-		No significant changes in flows expected. No likely effect anticipated on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.	No scheme elements on the upstream water body (GB109054044110) were identified as having a significant effect on this quality element.	Scheme elements present on the River Leam and its tributaries are identified as having only very localised (viaduct) or temporary (river diversion) on this quality element. Therefore, no effect is anticipated at the scale of the water body. This quality element does not currently have a status.	No additional mitigation required	No additional mitigation required	Minor and localised effects	-
	3. Macroinvertebrates	Good	Good		No significant changes in flows expected. No likely effect anticipated on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.	No scheme elements on the upstream water body (GB109054044110) were identified as having a significant effect on this quality element.	Scheme element present on the River Leam (viaduct) is identified as having only very localised adverse effect on this quality element. On the tributaries, the river diversion is considered as having the potential for a temporary adverse effect that would be balanced by the creation of new habitat. The only permanent adverse effect identified is a culvert located on a tributary of the River Leam which supports low macroinvertebrate quality. Therefore, the scheme is not considered as having the potential to lead to a deterioration of the current WFD status (Good) of this quality element. Achievement of the WFD status objectives (which are for the status to remain Good) for this quality element should not be compromised.	No additional mitigation required	No additional mitigation required		
	4. Fish	Good	Good		No significant changes in flows expected. No likely effect anticipated on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.	No scheme elements on the upstream water body (GB109054044110) were identified as having a significant effect on this quality element.	Scheme element present on the River Leam (viaduct) is identified as having only very localised adverse effect on this quality element. On the tributaries, the river diversion is considered as having the potential for a temporary adverse effect that would be balanced by the creation of new habitat. The only permanent adverse effect identified is a culvert, which could constitute a barrier to fish migration. However, the culvert is located on a tributary of the River Leam which is considered to be of low spawning habitat value for fish. Therefore, although the River Leam is a designated salmonid fisheries, it is likely that the scheme has no potential to deteriorate the current WFD status (Good) and WFD status objectives (status to remain Good) for this quality element.	No additional mitigation required	No additional mitigation required		
	Physico-Chemical status											
WFD classification elements	5. Dissolved Oxygen	High		Predicted change to status elements (green = none, amber = possibly, red = likely)	No significant changes in flows expected. No likely effect anticipated on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.	No scheme elements on the upstream water body (GB109054044110) were identified as having a significant effect on this quality element.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	No additional mitigation required	No additional mitigation required	Minor and localised effects	-
	6. pH	High			No significant changes in flows expected. No likely effect anticipated on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.	No scheme elements on the upstream water body (GB109054044110) were identified as having a significant effect on this quality element.					
	7. Phosphate	Moderate			No significant changes in flows expected. No likely effect anticipated on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.	No scheme elements on the upstream water body (GB109054044110) were identified as having a significant effect on this quality element.					
	8. Ammonia	High			No significant changes in flows expected. No likely effect anticipated on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.	No scheme elements on the upstream water body (GB109054044110) were identified as having a significant effect on this quality element.					
	9. Temperature	-	-		No significant changes in flows expected. No likely effect anticipated on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.	No scheme elements on the upstream water body (GB109054044110) were identified as having a significant effect on this quality element.					
	10. Specific Pollutants (Annex VIII)	High			No significant changes in flows expected. No likely effect anticipated on this quality element.	No changes in water quality expected. No likely effect anticipated on this quality element.	No scheme elements on the upstream water body (GB109054044110) were identified as having a significant effect on this quality element.					
	Hydromorphological status											**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	• No significant changes in flows expected and therefore no likely effect anticipated on hydromorphology.	N/A	• No scheme elements on upstream water body identified as having a significant effect on hydromorphology and therefore no impact from upstream water body identified.	• River diversion (lengthening) may reduce flow rates in river although likely to be localised and therefore impacts on flow dynamics and hydromorphology are unlikely to be significant. • The culvert is unlikely to impact flows considering the size of the channel, but culverting will disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity. However, considering the size of the watercourse it is considered that there would only be minor impact on a small proportion of the water body.	Undertake hydromorphological surveys to aid detailed design Incorporate hydromorphological measures into detailed design where practicable. Mitigation measures may include: • Create low flow channels in over-widened/over-deepened channels • Create reed fringes • Introduce riparian vegetation/green corridors where space allows • Recreate a sinuous river channel (re-meandering) where space allows • Retain marginal vegetation • Use of engineering techniques to assist natural recovery • Use soft engineering techniques		Minor and localised effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-			N/A						
	13. River continuity	-	-			N/A						
	14. River depth and width variation bed	-	-			N/A						
	15. Structure and substrate of river bed	-	-			N/A						
	16. Structure of riparian zone	-	-			N/A						

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen								
NOT REQUIRED FOR THE ASSESSMENT OF THIS WATER BODY	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	River Avon Viaduct (footings in or within riparian zone of watercourse)					Cutting		Impacts from other WFD water bodies (assessed separately) - cuttings (GB109054043920 - R Avon - Clayoton Yelvertoft Bk to confl R Sowe)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB109054043840	Moderate	Good Ecological Status by 2027	Description of scheme element impact	75m long viaduct with one footing. River passes between southern embankment and footing (within 10m). SWC-CFA18-012					River Avon: Agricultural centre cutting (139+800 approximately), Glasshouse Wood cutting (140+500 approximately)				Construction	Operation		
River Avon (Warwickshire) - confluence River Sowe to confluence River Leam			Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.						
WFD Classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	2. Macrophytes and phytobenthos - macrophytes	N/A	N/A		Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to very localised loss of macrophyte habitat (due to structures near to bank). The River Avon supports abundant and diverse aquatic vegetation in this stretch (HS2 baseline survey). Minor and very localised adverse effect anticipated.	Potential loss of macrophytes due to reduction in photosynthetic activity. The River Avon supports abundant and diverse aquatic vegetation in this stretch (HS2 baseline survey). Very localised adverse effect anticipated.	No significant effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect macrophytes.	Glasshouse Wood cutting is identified as having no impact on the River Avon. However, Agricultural Centre cutting is however likely to lead to localised reduction in flows on the River Avon during dewatering. The River Avon supports abundant and diverse aquatic vegetation in this stretch (HS2 baseline survey). Localised and temporary adverse effect anticipated.	Localised and temporary adverse effect anticipated. Negligible effect anticipated on this quality element.	The upstream water Body (GB109054043920) is only impacted by cuttings. Effects of the agricultural Centre cutting already considered in the adjoining cutting column.	Scheme elements impacting the River Avon are only considered to have very localised and minor (viaduct) or temporary and localised (cuttings) adverse effects on this quality element. Therefore, the scheme is not considered as having the potential to lead to the deterioration of the current WFD status for this quality element. Macrophytes do not have a status.	None required.	None required.	Minor and localised effects	
	3. Macroinvertebrates	Moderate	Good by 2027		Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to very localised but permanent loss of macroinvertebrate habitat (i.e. riparian vegetation, marginal aquatic macrophytes). The watercourse supports locally moderate macroinvertebrate quality (HS2 baseline surveys). Minor and very localised adverse effect anticipated.	Shade increase likely to lead to localised but permanent loss of macroinvertebrate habitat (i.e. riparian vegetation, marginal aquatic macrophytes). The watercourse supports locally moderate macroinvertebrate quality (HS2 baseline surveys). Minor localised adverse effect anticipated.	No significant effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect macrophytes.	Glasshouse Wood cutting is identified as having no impact on the River Avon. However, Agricultural Centre cutting is however likely to lead to localised reduction in flows on the River Avon during dewatering. The River Avon supports locally moderate macroinvertebrate quality (HS2 baseline surveys). Localised and temporary adverse effect anticipated.	Localised and temporary adverse effect anticipated. Negligible effect anticipated on this quality element.	The upstream water Body (GB109054043920) is only impacted by cuttings. Effects of the agricultural Centre cutting already considered in the adjoining cutting column.	Scheme elements impacting the River Avon are only considered to have very localised and minor (viaduct) or temporary and localised (cuttings) adverse effects on this quality element. Therefore, the scheme is not considered as having the potential to lead to the deterioration of the current WFD status for this quality element (Moderate), and is unlikely to comprise the achievement of the WFD objectives for this quality element (which are for the Status to be Good by 2027).	None required.	None required.	Minor and localised effects	
	4. Fish	N/A	N/A		Localised and temporary adverse effect during construction. No deterioration of the water body status of the element is however expected.	Likely to lead to very localised but permanent loss of fish habitat (i.e. riparian vegetation, marginal aquatic macrophytes). Baseline surveys showed moderate fish species diversity (including eels) and abundances. In addition, the River Avon is a designated salmonid fisheries (Freshwater Fish Directive) and historical data (Environment Agency) showed the presence of brown trout. Very localised and minor adverse effect anticipated.	Shade increase likely to lead to localised but permanent loss of fish habitats (i.e. riparian vegetation, marginal aquatic macrophytes). Baseline surveys showed moderate fish species diversity (including eels) and abundances. In addition, the River Avon is a designated salmonid fisheries (Freshwater Fish Directive) and historical data (Environment Agency) showed the presence of brown trout. Very localised and minor adverse effect anticipated.	No significant effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect fish.	Glasshouse Wood cutting is identified as having no impact on the River Avon. However, Agricultural Centre cutting is however likely to lead to localised reduction in flows on the River Avon during dewatering. Baseline surveys showed moderate fish species diversity (including eels) and abundances. In addition, the River Avon is a designated salmonid fisheries (Freshwater Fish Directive) and historical data (Environment Agency) showed the presence of brown trout. Localised and temporary adverse effect anticipated.	Localised and temporary adverse effect anticipated. Negligible effect anticipated on this quality element.	The upstream water Body (GB109054043920) is only impacted by cuttings. Effects of the agricultural Centre cutting already considered in the adjoining cutting column.	Scheme elements impacting the River Avon are only considered to have very localised and minor (viaduct) or temporary and localised (cuttings) adverse effects on this quality element. Therefore, the scheme is not considered as having the potential to affect this quality element at the scale of the water body.	Fish relocation during dewatering operations must be considered. Fish removal from the areas impacted by temporary dewatering to be considered as dewatering will be taking place. Possible relocation to suitable areas downstream of the works.	None required.	Minor and localised effects	
Physico-Chemical status																
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• Water quality could be reduced in the depleted reaches due to reduced inflow of water and reduced flow rates, turbulence and oxygenation.	Localised and temporary adverse effect anticipated. Negligible effect anticipated on this quality element.	Upstream water body not impacted by scheme	Potential minor and localised effects on element.	None required.	None required.	Potential minor or localised effects	
	6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream water body not impacted by scheme	Receptor is insensitive to impact			No significant effects	
	7. Phosphate	Poor	-		N/A	N/A	N/A	ffectively an open span bridge, so there would be n	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	Localised and temporary adverse effect anticipated. Negligible effect anticipated on this quality element.	Upstream water body not impacted by scheme	Depending on how much flow is lost, potential minor and localised effects on element.			Potential minor or localised effects	
	8. Ammonia	Good	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Localised and temporary adverse effect anticipated. Negligible effect anticipated on this quality element.	Upstream water body not impacted by scheme	Potential minor and localised effects on element.			Potential minor or localised effects	
	9. Temperature	-	-		N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream water body not impacted by scheme	Receptor is insensitive to impact			No significant effects	
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Localised and temporary adverse effect anticipated. Negligible effect anticipated on this quality element.	Upstream water body not impacted by scheme	Potential minor and localised effects on element.			Potential minor or localised effects	
Hydromorphological status																**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	• Due to the vicinity of Glasshouse Wood cutting to the River Avon, there is a potential in groundwater contribution to river flows. • Reduction in flows in River Avon is unlikely to be significant in the context of the groundwater and surface water contributions from the wider catchment. • Reduction of flows in the tributary could cause a localised reduction in flow volumes, depths and dynamics, and consequent reductions in sediment transport (and increased sediment deposition) and reduced out-of-channel habitat connectivity. The effects could be significant for this tributary, but would be buffered as soon as the tributary connects to the larger downstream watercourse so there would not be severe effects at water body scale	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Upstream water body not impacted by scheme	• Footings in riparian zones or floodplains could cause some local turbulence at flood flows, but would not considered to be significant. • Unlikely to be any measurable impact on hydromorphology from any reduction in groundwater contribution to surface water flow in the vicinity of Glasshouse Wood cutting • Due to the vicinity of Glasshouse Wood cutting to the River Avon, there is a potential in groundwater contribution to river flows. • Reduction in flows in River Avon is unlikely to be significant in the context of the groundwater and surface water contributions from the wider catchment.	None required.	None required.	Minor or localised effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A		N/A			Upstream water body not impacted by scheme				
	13. River continuity	-	-		N/A	N/A	N/A		N/A			Upstream water body not impacted by scheme				
	14. River depth and width variation bed	-	-		N/A	N/A	N/A		N/A			Upstream water body not impacted by scheme				
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A		N/A			Upstream water body not impacted by scheme				
	16. Structure of riparian zone	-	-		N/A	N/A	N/A		N/A			Upstream water body not impacted by scheme				

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen														
NONE identified in Appendix B of RBMP	-	-	Predicted change to status elements (green = none, amber = possible, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Cutting		Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
	GB109054043920			Description of scheme element impact	River Avon: Agricultural centre cutting (139+800 approximately), Cubbington cutting (137+000 approximately), Glasshouse Wood cutting (140+500 approximately)				Construction	Operation		
	River Avon - Claycoton Yelvertoft Brook to confluence River Sowe	Poor	Good by 2027	Identified biological impacts	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	n/a	n/a	Predicted change to status elements (green = none, amber = possibly, red = likely)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	
	2. Macrophytes and phytobenthos - macrophytes	Good	Good		Glasshouse Wood and Cubbington cuttings are identified as having no significant impact on the River Avon. However, Agricultural Centre cutting is however likely to lead to localised reduction in flows on the River Avon during dewatering. The River Avon supports abundant and diverse aquatic vegetation in this stretch (HS2 baseline surveys). Localised and temporary adverse effect anticipated.	Localised and temporary adverse effect anticipated. Negligible effect anticipated on this quality element.	No scheme element on upstream water body	Neither the River Avon nor any of its tributaries are directly crossed by the scheme. Although there may be some minor a highly localised effects (due to the cuttings). no deterioration of the current WFD status of the macrophytes quality element (Good) is anticipated, and the scheme will not compromise the achievement of the WFD status objectives for this element (which are for the status to remain Good by 2015).	None required.	None required.	No deterioration of the current WFD status of the macrophytes quality element (Good) is anticipated, and the scheme will not compromise the achievement of the WFD status objectives for this element (which are for the status to remain Good by 2015).	
	3. Macroinvertebrates	Moderate	Good by 2027		Glasshouse Wood and Cubbington cuttings are identified as having no significant impact on the River Avon. However, Agricultural Centre cutting is however likely to lead to localised reduction in flows on the River Avon during dewatering. The watercourse supports locally moderate macroinvertebrate quality (HS2 baseline surveys). Localised and temporary adverse effect anticipated.	Localised and temporary adverse effect anticipated. Negligible effect anticipated on this quality element.	No scheme element on upstream water body	Neither the River Avon nor any of its tributaries are directly crossed by the scheme. One of the two cuttings is identified as having the potential for a temporary and adverse effect on this quality element. No deterioration of the current WFD status of the macrophytes quality element (Moderate) is anticipated, and the scheme will not compromise the achievement of the WFD status objectives for this element (which are for the status to be Good by 2027).	None required.	None required.	No deterioration of the current WFD status of the macrophytes quality element (Moderate) is anticipated, and the scheme will not compromise the achievement of the WFD status objectives for this element (which are for the status to be Good by 2027).	
	4. Fish	Good	Good		Glasshouse Wood and Cubbington cuttings are identified as having no significant impact on the River Avon. However, Agricultural Centre cutting is however likely to lead to localised reduction in flows on the River Avon during dewatering. Baseline surveys showed moderate fish species diversity (including eel) and abundances. In addition, the River Avon is a designated salmonid fisheries (Freshwater Fish Directive) and historical data (Environment Agency) showed the presence of brown trout. Localised and temporary adverse effect anticipated.	Localised and temporary adverse effect anticipated. Negligible effect anticipated on this quality element.	No scheme element on upstream water body	Neither the River Avon nor any of its tributaries are directly crossed by the scheme. One of the two cuttings is identified as having the potential for a temporary and adverse effect on this quality element. Therefore, the scheme will be considered as having a temporary and adverse effect on this quality element. It would not lead to a deterioration of the current WFD status (Good) and would not compromise the WFD status objectives (Good by 2015) of this quality element.	None required.	None required.	No deterioration of the current WFD status of this quality element (Good) is anticipated. Therefore, the scheme is not considered to compromise the achievement of the WFD status objectives for this element (which are for the status to remain Good by 2015).	
	Physico-Chemical status											
WFD classification elements	5. Dissolved Oxygen	Good	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	Localised and temporary adverse effect anticipated. Negligible effect anticipated on this quality element.	No scheme element on upstream water body	Potential minor and localised effects on element.	None required.	None required.	Potential minor or localised effects	
	6. pH	High	-		Receptor is insensitive to impact	Receptor is insensitive to impact	No scheme element on upstream water body	Receptor is insensitive to impact			No significant effects	
	7. Phosphate	Poor	-		• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	Localised and temporary adverse effect anticipated. Negligible effect anticipated on this quality element.	No scheme element on upstream water body	Depending on how much flow is lost, potential minor and localised effects on element.			Potential minor or localised effects	
	8. Ammonia	High	-		• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Localised and temporary adverse effect anticipated. Negligible effect anticipated on this quality element.	No scheme element on upstream water body	Potential minor and localised effects on element.			Potential minor or localised effects	
	9. Temperature	-	-		Receptor is insensitive to impact	Receptor is insensitive to impact	No scheme element on upstream water body	Receptor is insensitive to impact			No significant effects	
	10. Specific Pollutants (Annex VIII)	High	-		• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Localised and temporary adverse effect anticipated. Negligible effect anticipated on this quality element.	No scheme element on upstream water body	Potential minor and localised effects on element.			Potential minor or localised effects	
	Hydromorphological status											**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	The potential reduction of the groundwater contribution to surface water flows is unlikely to significantly impact the hydromorphology of the watercourse, especially considering the length of the watercourse impacted in the context of the wider catchment and water will be reintroduced to surface watercourses through SUDs.	N/A	No scheme element on upstream water body	No significant effects	None required.	None required.	No significant effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-			N/A	No scheme element on upstream water body					
	13. River continuity	-	-			N/A	No scheme element on upstream water body					
	14. River depth and width variation bed	-	-			N/A	No scheme element on upstream water body					
	15. Structure and substrate of river bed	-	-			N/A	No scheme element on upstream water body					
	16. Structure of riparian zone	-	-			N/A	No scheme element on upstream water body					

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen								
-	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Impacts from other WFD water bodies (assessed separately) - multiple scheme elements (GB109054044480 - Finham Bk - conf Canley Bk to conf R Sowe)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	-
	GB109054044540			Description of scheme element impact			Construction	Operation		
	River Sowe - confluence with Smite Brook to confluence with River Avon	Poor	Good by 2027	Identified biological impacts						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	N/A	N/A		Scheme elements present on the Finham Brook water body were identified as having only temporary and localised (cuttings) or very localised and minor (viaduct) effects. Therefore, and given the distance between scheme elements on Finham Brook and the River Sowe, no direct effect anticipated on this quality element.	No direct scheme elements present on the River Sowe. Scheme elements present on the upstream water body were not identified as having the potential for an effect on the River Sowe. The quality element does not have a status.	None required.	None required.	This quality element does not currently have a status. No effect anticipated from the scheme.	
	3. Macroinvertebrates	Moderate	Good by 2027		Scheme elements present on the Finham Brook water body were identified as having only temporary and localised (cuttings) or very localised and minor (viaduct) effects. Therefore, and given the distance between scheme elements on Finham Brook and the River Sowe, no direct effect anticipated on this quality element.	No direct scheme elements present on the River Sowe. Scheme elements present on the upstream water body were not identified as having the potential for an effect on the River Sowe. Therefore, the scheme is not considered has having the potential for a degradation in the current WFD status (Moderate) for this quality element, and would not compromise the achievement of the WFD status objectives (which re for the status to be good by 2027).	None required.	None required.	The scheme is not considered has having the potential for a degradation in the current WFD status (Moderate) for this quality element, and would not compromise the achievement of the WFD status objectives (which re for the status to be good by 2027).	
	4. Fish	Moderate	Good by 2027		Scheme elements present on the Finham Brook water body were identified as having only temporary and localised (cuttings) or very localised and minor (viaduct) effects. As the River Sowe is a designated fisheries (Freshwater Fish Directive), drops in water levels during cuttings dewatering operation could have an adverse effect on this quality element. However, given the distance from the scheme elements present on Finham Brook and the River Sow (4 km approximately), only a minor adverse effect is anticipated.	No direct scheme elements present on the River Sowe. Scheme elements present on the upstream water body and notably cuttings were not identified as having the potential for a temporary effect on this quality element. However, as the effect is likely to be temporary, and given the distance from the scheme elements present on Finham Brook and the River Sow (4 km approximately), only a minor adverse effect is anticipated. Therefore, no degradation of the current WFD status (Moderate) for this element is anticipated, and achievement of the WFD status objectives (Good by 2027) should not be compromised.	None required.	None required.	The scheme is not considered has having the potential for a degradation in the current WFD status (Moderate) for this quality element, and would not compromise the achievement of the WFD status objectives (which re for the status to be good by 2027).	
	Physico-Chemical status									
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	Provided mitigation measures are implemented on the Finham Brook crossings, there will be no impact on the River Sowe.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	No significant effect	-
	6. pH	High	-							
	7. Phosphate	Moderate	-							
	8. Ammonia	High	-							
	9. Temperature	-	-							
	10. Specific Pollutants (Annex VIII)	High	-							
	Hydromorphological status									Hydromorphology Baseline
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	Considering distance from crossing on Finham Brook (>2km) and localised impacts that are likely on this watercourse, there is unlikely to be any impact on the River Sowe.	Given the distance from the upstream WFD water body that is crossed by the route, and the localised impacts identified, it is unlikely that any measurable hydromorphological effects will be present on this water body.	None required.	None required.	No significant effect	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-							
	13. River continuity	-	-							
	14. River depth and width variation bed	-	-							
	15. Structure and substrate of river bed	-	-							
	16. Structure of riparian zone	-	-							

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	-	-	-	-	-	-	-
NOT REQUIRED FOR THIS ASSESSMENT	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Viaduct (clear span)					Cutting		Cutting		Impacts from other WFD water bodies (assessed separately) - Multiple scheme elements (Canley Bk - source to conf with Finham Bk (GB109054044520))	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	-
GB109054044480	Moderate	Good by 2027	Description of scheme element impact	Finham Brook Viaduct - 141-L1 (141+365), 1.9 m above ground level					Finham Brook: Kenilworth cutting (141+400 approximately), Glasshouse Wood cutting (140+500 approximately)		Burton Green retaining wall: Finham Brook				Construction	Operation		
Finham Brook - confluence Canley Brook to confluence River Sowe			Identified biological impacts	Vibration leading to disturbance	Landtake (for bridge footings) leading to loss of habitat and reduced connectivity	Shading leading to loss of habitats/sensitive vegetation	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Run off from bridge span resulting in changes to water quality	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.					
1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Particle charge to take element/ganet (rare, rather unlikely, or likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Cumulative effects from the scheme elements (cuttings, retaining walls, significant river diversion of Canley Brook) present on Canley Brook water body were identified as having the potential for permanent adverse effects on flows at the scale of the Canley Brook water body. However, these were considered to be localised on Canley Brook and therefore, no adverse effect is anticipated on Finham Brook. In addition, as the watercourse currently supports very few to no aquatic vegetation downstream of the confluence with Canley Brook (402 baseline surveys), effect anticipated to be negligible at the scale of the water body.	N/A				
2. Macrophytes and phytobenthos - macrophytes	N/A	N/A	Receptor not sensitive to impact. No likely effect anticipated.	No footings in the watercourse. No likely effect anticipated.	Potential loss of macrophytes due to reduction in physico-chemistry activity. Finham Brook is heavily shaded and supports no aquatic macrophytes within the stretch impacted (402 baseline surveys). Effect likely to be negligible.	No significant hydromorphological effect identified. No likely effect on this quality element.	Drainage (including balancing ponds) has been designed to reduce the risk and volume of run off from the proposed railway. No anticipated change in water quality.	Potential decrease in flows on Finham Brook during dewatering. Finham Brook is heavily shaded and supports no aquatic macrophytes within the stretch impacted (402 baseline surveys). Effect likely to be negligible.	Potential localised adverse effects on water quality of Finham Brook. Finham Brook currently heavily shaded and supporting no aquatic vegetation within the area impacted. Effect likely to be negligible.	Only minor effects anticipated on baseflows of Finham Brook. Finham Brook currently heavily shaded and supporting no aquatic vegetation within the area impacted. Effect likely to be negligible.	Potential localised adverse effects on water quality of Finham Brook. The watercourse currently supports poor fish habitat quality but low species diversity, although brown trout were recorded (402 baseline surveys). Finham Brook is also designated under the Freshwater Fish Directive. Effect likely to be localised.	Cumulative effects from the scheme elements (cuttings, retaining walls, significant river diversion of Canley Brook) present on the Canley Brook water body were identified as having the potential for permanent adverse effects on flows at the scale of the Canley Brook water body. However, these were considered to be localised on Canley Brook and therefore, no adverse effect is anticipated on Finham Brook. In addition, as the watercourse currently supports very few to no aquatic vegetation downstream of the confluence with Canley Brook (402 baseline surveys), effect anticipated to be negligible at the scale of the water body.	The scheme elements present on Finham Brook are identified as having localised (viaduct) or temporary (retaining wall) adverse effect on this quality elements. However, cumulative effects from scheme elements located on the upstream water body (Canley Brook) are considered as having the potential for an adverse effect on this quality element at the scale of the water body. Significant diversion of Canley Brook, cuttings and retaining wall) were also considered as having the potential for an adverse effect on Finham Brook, due to potential significant adverse effects on a macroinvertebrate communities on Canley Brook, a major tributary of Finham Brook. Therefore, the overall effect of the scheme is likely to be adverse locally, with a potential deterioration of the current WFD status (Moderate) of this quality element cannot be ruled out.	None required.	None required.	No significant effects.	-
3. Macroinvertebrates	Moderate	Good by 2027	Receptor not sensitive to impact. No likely effect anticipated.	No footings in the watercourse. No likely effect anticipated.	Shade increase likely to lead to localised but permanent loss of fish habitats (i.e. riparian vegetation). The watercourse currently supports good fish habitat quality but low species diversity, although brown trout were recorded (402 baseline surveys). Finham Brook is also designated under the Freshwater Fish Directive. Very localised and minor effect expected, with no further effect at the scale of the water body.	No significant hydromorphological effect identified. No likely effect on this quality element.	Drainage (including balancing ponds) has been designed to reduce the risk and volume of run off from the proposed railway. No anticipated change in water quality.	Potential decrease in flows on Finham Brook during dewatering. The watercourse currently supports good fish habitat quality but low species diversity, although brown trout were recorded (402 baseline surveys). Finham Brook is also designated under the Freshwater Fish Directive. Effect likely to be localised.	Potential localised adverse effects on water quality of Finham Brook. Finham Brook currently heavily shaded and supporting no aquatic vegetation within the area impacted. Effect likely to be negligible.	Only minor effects anticipated on baseflows of Finham Brook. The watercourse currently supports good fish habitat quality but low species diversity, although brown trout were recorded (402 baseline surveys). Finham Brook is also designated under the Freshwater Fish Directive. Effect likely to be localised.	Potential localised adverse effects on water quality of Finham Brook. The watercourse currently supports good fish habitat quality but low species diversity, although brown trout were recorded (402 baseline surveys). Finham Brook is also designated under the Freshwater Fish Directive. Effect likely to be localised.	Cumulative effects from the scheme elements (cuttings, retaining walls, significant river diversion of Canley Brook) present on the Canley Brook water body were identified as having the potential for permanent adverse effects on flows at the scale of the Canley Brook water body. However, these were considered to be localised on Canley Brook and therefore, no adverse effect is anticipated on Finham Brook. In addition, as the watercourse currently supports very few to no aquatic vegetation downstream of the confluence with Canley Brook (402 baseline surveys), effect anticipated to be negligible at the scale of the water body.	The scheme elements present on Finham Brook are identified as having localised (viaduct, cutting) or temporary (retaining wall) adverse effect on this quality elements. However, cumulative effects from scheme elements located on the upstream water body (Canley Brook) are considered as having the potential for an adverse effect on this quality element at the scale of the water body. Significant diversion of Canley Brook, cuttings and retaining wall) were also considered as having the potential for an adverse effect on Finham Brook, due to potential significant adverse effects on a macroinvertebrate communities on Canley Brook, a major tributary of Finham Brook. Therefore, the overall effect of the scheme is likely to be adverse locally, with a potential deterioration of the current WFD status (Moderate) of this quality element cannot be ruled out.	None required.	None required.	Overall effect of the scheme likely to be adverse locally, with no deterioration of the current WFD status (Moderate). In addition, the achievement of Good status by 2027 for this quality element should not be compromised.	-
4. Fish	N/A	N/A	Localised and temporary adverse effect during construction. No deterioration of the current WFD status for this element is however expected.	No footings in the watercourse. No likely effect anticipated.	Shade increase likely to lead to localised but permanent loss of fish habitats (i.e. riparian vegetation). The watercourse currently supports good fish habitat quality but low species diversity, although brown trout were recorded (402 baseline surveys). Finham Brook is also designated under the Freshwater Fish Directive. Very localised and minor effect expected, with no further effect at the scale of the water body.	No significant hydromorphological effect identified. No likely effect on this quality element.	Drainage (including balancing ponds) has been designed to reduce the risk and volume of run off from the proposed railway. No anticipated change in water quality.	Potential decrease in flows on Finham Brook during dewatering. The watercourse currently supports good fish habitat quality but low species diversity, although brown trout were recorded (402 baseline surveys). Finham Brook is also designated under the Freshwater Fish Directive. Effect likely to be localised.	Potential localised adverse effects on water quality of Finham Brook. Finham Brook currently heavily shaded and supporting no aquatic vegetation within the area impacted. Effect likely to be negligible.	Only minor effects anticipated on baseflows of Finham Brook. The watercourse currently supports good fish habitat quality but low species diversity, although brown trout were recorded (402 baseline surveys). Finham Brook is also designated under the Freshwater Fish Directive. Effect likely to be localised.	Potential localised adverse effects on water quality of Finham Brook. The watercourse currently supports good fish habitat quality but low species diversity, although brown trout were recorded (402 baseline surveys). Finham Brook is also designated under the Freshwater Fish Directive. Effect likely to be localised.	Cumulative effects from the scheme elements (cuttings, retaining walls, significant river diversion of Canley Brook) considered to have the potential for permanent adverse effects on flows at the scale of the Canley Brook water body. Finham Brook and Finham Brook is a designated salmonid fisheries (Freshwater Fish Directive) and as both Canley Brook and Finham Brook support migratory fish species (brown trout), the scheme is considered to have the potential for an adverse effect on this quality element at the scale of the water body.	The scheme elements present on Finham Brook are identified as having very localised (viaduct, cutting) or temporary (retaining wall) adverse effect on this quality elements. However, cumulative effects from scheme elements located on the upstream water body (Canley Brook) are considered as having the potential for an adverse effect on this quality element at the scale of the water body. Significant diversion of Canley Brook, cuttings and retaining wall) were also considered as having the potential for an adverse effect on Finham Brook, due to potential significant adverse effects on a macroinvertebrate communities on Canley Brook, a major tributary of Finham Brook. Therefore, the overall effect of the scheme is likely to be adverse locally, with a potential deterioration of the current WFD status (Moderate) of this quality element cannot be ruled out.	Fish relocation during dewatering operations must be considered. Fish removal from the areas impacted by temporary dewatering to be considered while dewatering will be taking place. Possible relocation is suitable areas downstream of the works.	None required.	Providing that the additional mitigation measures proposed are implemented, the overall effect of the scheme on this scheme element would be considered as not significant and no further effect at the scale of the water body.	-
Physico-Chemical status																		
5. Dissolved Oxygen	High	-	Particle charge to take element/ganet (rare, rather unlikely, or likely)	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen	Potential decrease in flows on Finham Brook during dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	• Water quality could be reduced in the depleted reaches due to the reduced flows and reduced flow rates, turbulence and oxygenation.	Potential decrease in flows on Finham Brook during dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	• Water quality could be reduced in the depleted reaches due to the reduced flows and reduced flow rates, turbulence and oxygenation.	Potential minor and localised effects on element.	Potential minor and localised effects on element.			Implementation of CoCP measures (Section 10) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects. Risk-based approach to determine the percentage increase in pollutant. If necessary treatment will be provided prior to discharge.	-
6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact		Receptor is insensitive to impact				
7. Phosphate	Good	-		N/A	N/A	N/A	Positively as open span bridge, so there would be no impact on phosphate	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate	Potential decrease in flows on Finham Brook during dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	Potential decrease in flows on Finham Brook during dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.		Depending on how much flow is lost, potential minor and localised effects on element. Risk of deterioration of current WFD status (Good) for this element is low. Given that phosphate concentrations, if a significant amount of flow is lost. This risk is flagged as having potential to have adverse effect and deteriorate phosphate status.				
8. Ammonia	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Potential decrease in flows on Finham Brook during dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects.	Potential decrease in flows on Finham Brook during dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects.		Potential minor and localised effects on element.				
9. Temperature	-	-		N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact		Receptor is insensitive to impact				
10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants	• CoCP measures (Section 10) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants	Potential decrease in flows on Finham Brook during dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects.	Potential decrease in flows on Finham Brook during dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects.		Potential minor and localised effects on element.				
Hydromorphological status																		Hydromorphology Baseline
11. Quantity and dynamics of river flow	-	-	Particle charge to take element/ganet (rare, rather unlikely, or likely)	N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river resists against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	• It is unlikely that reduction of groundwater contribution to flows in Finham Brook will have adverse impact on the quantity and dynamics of flows considering that captured water will be reintroduced to ground via SuDS. • There is still a localised risk because the water body is already affected by abstraction, and the hydrology rating for this waterbody is moderate, which does not support Good ecological status/potential) due to abstraction	N/A	• It is unlikely that reduction of groundwater contribution to flows in Finham Brook will have adverse impact on the quantity and dynamics of flows considering that captured water will be reintroduced to ground via SuDS. • There is a localised risk because the water body is already affected by abstraction, and the hydrology rating for this waterbody is moderate, which does not support Good ecological status/potential) due to abstraction	N/A	Cumulative effects from the scheme elements (cuttings, retaining walls, significant river diversion of Canley Brook) on the Canley Brook water body have the potential for permanent adverse effects on flows in the Canley Brook water body, which could affect Finham Brook	• Viaduct footings in the floodplain are unlikely to be any significant impacts on hydromorphology • It is unlikely that reduction of groundwater contribution to flows in Finham Brook will have adverse impact on the quantity and dynamics of flows considering that captured water will be reintroduced to ground via SuDS. • However, this water body is at moderate status, any impacts on hydromorphology could be significant • The potential cumulative impacts in this water body combined with impacts occurring from the upstream connecting water body (Canley Brook), mainly in terms of decreased flow rates associated with cuttings, mean that hydromorphological deterioration could occur at water body scale	Undertaken hydromorphological surveys to inform detailed design development to incorporate hydromorphology mitigation into detailed design where practicable. Mitigation measures that might be considered at detailed design include: • Riparian mesh tunnels • Implementation of SUDS • Introduce riparian vegetation/green corridors where space allows • Retain marginal vegetation	Reasons following detailed design. Potential to drop to Yellow if mitigation incorporated in detailed design.	• Hydromorphology baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significant in the overall water body.	-
12. Connection to Groundwater	-	-		N/A	N/A	N/A		N/A		N/A		N/A						
13. River continuity	-	-		N/A	N/A	N/A		N/A	• There is a localised risk that continuity could be deteriorated by reductions in groundwater flows despite the SuDS. However, as the water body is already at risk, it is already affected by abstraction and could be sensitive	N/A	• There is a localised risk that continuity could be deteriorated by reductions in groundwater flows despite the SuDS. However, as the water body is already at risk, it is already affected by abstraction and could be sensitive	N/A						
14. River depth and width variation	-	-		N/A	N/A	N/A		N/A	• Flow velocities and depths are unlikely to be affected due to capture of discharge from the cuttings and return to groundwater by SuDS	N/A	• Flow velocities and depths are unlikely to be affected due to capture of discharge from the cuttings and return to groundwater by SuDS	N/A					
15. Structure and substrate of river bed	-	-		N/A	N/A	N/A		N/A	• Flow dynamics and sediment regime are unlikely to be affected due to the SuDS, so there is unlikely to be detrimental impact of sediments due to the cuttings, or increase in channel sedimentation due to decreased flow rates • However, habitats are sensitive to this water body (Finham Brook is a designated salmonid fisheries) and sediment transport, deposition or mobilisation could be significant	N/A	• Flow dynamics and sediment regime are unlikely to be affected due to the SuDS, so there is unlikely to be detrimental impact of sediments due to the cuttings, or increase in channel sedimentation due to decreased flow rates • However, habitats are sensitive to this water body (Finham Brook is a designated salmonid fisheries) and sediment transport, deposition or mobilisation could be significant	N/A					
16. Structure of riparian zone	-	-		N/A	N/A	N/A		N/A	• Riparian connectivity is unlikely to be affected because any reduction of groundwater contribution to flows in Finham Brook is unlikely to have adverse impacts on flow quantity and dynamics	N/A	• Riparian connectivity is unlikely to be affected because any reduction of groundwater contribution to flows in Finham Brook is unlikely to have adverse impacts on flow quantity and dynamics	N/A					

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objectives to be implemented or confirmed as implemented	Where RBMP measure will happen	Where RBMP measure will happen	Particle charge to take element/ganet (rare, rather unlikely, or likely)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
None identified in Appendix B of RBMP	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	River Diversion			Culvert					Cutting	
	GB109054044520			Description of scheme element impact	Canley Brook - 900 m diversion from approximately 143+000 to 142+500 - to avoid cutting - includes viaduct above new channel (Canley Brook viaduct - 143+200)			Unnamed tributaries of Canley Brook: CFA18-SW-015 (143+500) - culvert and realignment, CFA18-SW-017 (145+030) - culvert and realignment, CFA18-SW-018 (146+000) - culvert and realignment					Canley Brook: Kenilworth cutting (141+400 approximately), Crackley Road cutting	
	Canley Brook - source to confluence with Finham Brook	Moderate	Good by 2027	Identified biological impacts	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.
WFD classification elements	**1.Macrophytes and phytobenthos - diatoms**	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	-	-		There will be loss of marginal and channel macrophytes over the 500 m length of the existing Canley Brook that lies within the diverted section. Canley Brook heavily shaded and supporting few aquatic vegetation (HS2 baseline surveys). None of the species recorded are rare or notable, and it is anticipated that the macrophyte community will re-establish within 1 to 2 years of completion of the river diversion. Temporary adverse effect anticipated.	Design will also include marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. Canley Brook heavily shaded and supporting few aquatic vegetation (HS2 baseline surveys). As the length of the new channel will be increased in comparison to the existing channel, beneficial effect anticipated.	Localised impacts on flow dynamics predicted due to length of diversion, although the aim will be to create hydromorphological conditions to maintain ecological communities (ES Ecology chapter Volume 2).	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to a localised but permanent loss of habitat. The tributary located at chainage 145+030 is heavily shaded and supports no aquatic vegetation (HS2 baseline surveys). No baseline data available for the other tributaries. By default, very localised adverse effect anticipated, with no effect at the scale of the water body.	Potential modification of macrophytes communities, due to reduction in photosynthetic activity. The tributary located at chainage 145+030 is heavily shaded and supports no aquatic vegetation (HS2 baseline surveys). No baseline data available for the other tributaries. By default, very localised adverse effect anticipated, with no effect at the scale of the water body.	Some minor change to hydromorphology within the vicinity of the culvert may lead to localised effects on macrophytes.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Potential decrease in flows on Canley Brook during dewatering. Canley Brook heavily shaded and supporting few aquatic vegetation (HS2 baseline surveys). Temporary and localised adverse effect anticipated.	Potential localised adverse effects on water quality of Canley Brook. Effect likely to be negligible.
	3. Macroinvertebrates	Moderate	Good by 2027 ?		There will be loss of marginal and channel macrophytes over the 500 m length of the existing Canley Brook that lies within the diverted section. Canley Brook currently supports moderate to good macroinvertebrate quality (HS2 baseline surveys).Temporary adverse effect anticipated.	As the length of the new channel will be increased in comparison to the existing channel, the range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach, will represent an improvement for macroinvertebrate communities. Canley Brook currently supports moderate to good macroinvertebrate quality (HS2 baseline surveys). Effect on macroinvertebrates is considered to be beneficial.	Localised impacts on flow dynamics predicted due to length of diversion, although the aim will be to create hydromorphological conditions to maintain ecological communities (ES Ecology chapter Volume 2).	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to a localised but permanent loss of macroinvertebrate habitat (i.e. streambed, riparian vegetation). The tributary located at chainage 143+500 currently supports moderately low macroinvertebrate quality (HS2 baseline surveys). No baseline data available for the other tributaries. By default, very localised adverse effect anticipated, with no effect at the scale of the water body.	No additional effect anticipated (loss of habitat already included in the landtake impact), locally or at the scale of the water body.	Some minor change to hydromorphology within the vicinity of the culvert may lead to localised effects on macroinvertebrates.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Potential decrease in flows on Canley Brook during dewatering. Canley Brook currently supports moderate to good macroinvertebrate quality (HS2 baseline surveys). Temporary and localised adverse effect anticipated.	Potential localised adverse effects on water quality of Canley Brook. Effect likely to be negligible.
	4. Fish	-	-		Temporary and localised loss of fish habitat within Horn Brook and its tributary, while the new channels re-establish. Fish kills possible while dewatering existing channels, although translocation of fish will take place while dewatering (ES Ecology chapter Volume 2). Canley Brook currently support good fish habitat and low diversity (2 species), but brown trout were recorded (HS2 baseline surveys). Temporary adverse effect anticipated.	As the length of the new channel will be increased in comparison to the existing channel, the range of habitats incorporated into the diverted channel will represent an improvement for fish communities. Canley Brook currently support good fish habitat and low diversity (2 species), but brown trout were recorded (HS2 baseline surveys). Beneficial effect anticipated.	Localised impacts on flow dynamics predicted due to length of diversion, although the aim will be to create hydromorphological conditions to maintain ecological communities (ES Ecology chapter Volume 2).	Localised and temporary adverse effect during construction. No deterioration of the water body status of the element is however expected.	Likely to lead to very localised but permanent loss of fish habitat (i.e. riparian vegetation, slow flowing areas) and reduced connectivity with Canley Brook. No fish data available for any of the tributaries. Canley Brook currently supports brown trout population (HS2 baseline surveys). However, as the culverts will be located at the very upstream end of each tributary, only localised adverse effect anticipated, with no significant effect at the scale of the water body.	No additional effect anticipated (loss of habitat already included in the landtake impact), locally or at the scale of the water body.	Some minor change to hydromorphology within the vicinity of the culvert may lead to localised effects on fish habitat. No fish data available for any of the tributaries. Canley Brook currently supports brown trout population (HS2 baseline surveys). However, as the culverts will be located at the very upstream end of each tributary, only localised adverse effect anticipated, with no significant effect at the scale of the water body.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Potential decrease in flows on Canley Brook during dewatering. Canley Brook currently support good fish habitat and low diversity (2 species), but brown trout were recorded (HS2 baseline surveys).Temporary and localised adverse effect anticipated.	Potential localised adverse effects on water quality of Canley Brook. Effect likely to be negligible.
	Physico-Chemical status													
WFD classification elements	**5. Dissolved Oxygen**	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary in relation to the water body. • The new channel can provide, when re-established, similar/marginally improved dissolved oxygen levels as a result of the increased river length, allowing for improved habitat and subsequent increase in photosynthetic organisms. Overall effect likely to be minor beneficial, with opportunity to maintain the above good physico-chemical status of the water body.	• Potential drop in baseflow due to lack of alluvium in new channel. Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	N/A	N/A	Due to the length of the proposed culverts, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Potential decrease in flows on Canley Brook during dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.
	6. pH	High	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	7. Phosphate	Moderate	-		N/A	Receptor is insensitive to impact	• Potential drop in baseflow due to lack of alluvium in new channel. Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution. • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	Potential decrease in flows on Canley Brook during dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.
	8. Ammonia	High	-		N/A	Receptor is insensitive to impact	• Potential drop in baseflow due to lack of alluvium in new channel. Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Potential decrease in flows on Canley Brook during dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects
	9. Temperature	-	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culverts, there is likely to be a minor impact on temperature. This impact is likely to have a local effect in relation to the overall water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	10. Specific Pollutants (Annex VIII)	-	-		N/A	Receptor is insensitive to impact	• Potential drop in baseflow due to lack of alluvium in new channel. Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects • CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Potential decrease in flows on Canley Brook during dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.
	Hydromorphological status													
WFD classification elements	**11. Quantity and dynamics of river flow**	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	• The existing channel has a natural meandering form, although it may have been realigned around the A429 • Lengthening the channel to this extent is likely to reduce flow rates and subdue hydrodynamics, resulting in decreased flow velocity, turbulence and mixing / aeration, and increased sediment deposition • The baseflow channel would need to be narrowed to maintain flow rates, so there may not be any significant gain in hydraulic habitats	• The channel is approximately 3m in width, which suggests that there could be significant diversity of flow dynamics and hydromorphological deterioration if the channel is diverted, but probably not enough stream power for major channel adjustment. Review of historic maps shows that channel planform is stable at decadal scale • It appears that up to 1km of Canley Brook (the water body length is 11.3km) will be diverted (lengthened) and therefore could pose a significant impact to the hydromorphology of the watercourse. • Diverting this length of channel could be detrimental to natural, self regulating and sustainable channel regime conditions, and may require substantial engineering works to enforce the new flow path • The catchment is known to be affected by over-abstraction, and while morphological status supports good ecological condition, (Severn RBMP) quantity and dynamics of flow does not support good. • Lengthening the channel may reduce flow rates (velocity and turbulence / mixing / flow aeration) • The decreased flow rate could cause flows to back up upstream • Overall, it is considered that the impacts on flow dynamics are unlikely to be significant at water body scale, but the effect of lengthening the watercourse still needs to be flagged as a risk	N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • The unnamed tributary to Canley Brook is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	• The potential reduction of the groundwater contribution to surface water flows from Kenilworth Cutting could reduce flows and impact the general hydromorphology of the watercourse if the channel is diverted from alluvium to bedrock, and the flow regime could become more flashy • Reduction of flows in the tributary could cause a localised reduction in flow volumes, depths and dynamics, and consequent reductions in sediment transport (and increased sediment deposition) and reduced out-of-channel habitat connectivity. The effect could be significant for this tributary, but would be buffered as soon as the tributary connects to the larger downstream watercourse so there would not be severe effects at water body scale • An increasingly flashy regime could caused temporally-limited increases in scour, but not flushing of sediment in drawn out receding hydrographs limbs, resulting in increased sediment loadings in the channel	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects
	12. Connection to Groundwater	-	-		N/A	• Likely to be no significant relationship between hydromorphology and groundwater	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A		
	13. River continuity	-	-		N/A	• Lengthening the channel may result in reduced flow rates and increased sediment deposition in this reach, and may reduce riparian and floodplain connectivity • The opportunity to implement mitigation measures to improve habitats could help to improve biological continuity, if designed appropriately	• Lengthening the channel may result in increased channel storage and reduced floodplain connectivity	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A		
	14. River depth and width variation bed	-	-		N/A	• The diversion may need to narrow the channel baseflow to maintain flow rates, but could otherwise replicate existing (or possibly pre-alignment form if the channel was re-aligned around the A429) channel planform and cross section geometry • The extent of channel diversion means this could be a significant risk, since the general planform in this area appears to be naturally meandering. Channel form, e.g. around the A429 needs to be investigated further	• The diversion may need to narrow the channel baseflow to maintain flow rates, but could otherwise replicate existing (or possibly pre-alignment form if the channel was re-aligned around the A429) channel planform and cross section geometry, but the extent of channel diversion means this could be a significant risk • Lengthening the channel is likely to result in reduced flow depths, but this may be imperceptible	N/A	N/A	N/A	• Out-of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A		
	15. Structure and substrate of river bed	-	-		N/A	• Lengthening the channel could result in increased sediment deposition and decreased competence to transport bed substrates, which could be detrimental to bed particle size composition and bed forms (e.g. structure and spacing of pools and riffles) • Lengthening a channel tends to reduce flow rates and out-of-bank flows and can increase deposition of sediment • This could have a severely adverse effect on a large proportion of a water body that is already affected by over-abstraction, with implications for bed habitats	• Changing the natural channel course to this extent could result in channel adjustment as the watercourse tries to regain its existing planform through scour and associated sediment deposition, which would affect the existing hydraulic and sediment regimes. Hard engineering may be required to maintain the new channel course, which could further inhibit natural rates of bank erosion and sediment influx to the channel. It is impossible to predict the effects of a large scale channel diversion within the scope of this study, but this is a potentially severe risk to WFD objectives • Lengthening a channel tends to reduce flow rates and out-of-bank flows and can increase deposition of sediment • This could have a severely adverse effect on a large proportion of a water body that is already affected by over-abstraction, with implications for bed habitats	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A		
	16. Structure of riparian zone	-	-		N/A	• By replicating existing channel form in similar land cover, the quality of existing riparian connectivity and habitats should be preserved. However, hard engineering may be required to fix the channel in its new course • There could be a decrease in flow connectivity with riparian areas • Channel design could incorporate improved marginal habitats, but existing hydromorphology needs to be investigated in more detail	• By replicating existing channel form in similar land cover, the quality of existing riparian connectivity and habitats should be preserved. However, hard engineering may be required to fix the channel in its new course • There could be a decrease in flow connectivity with riparian areas	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A		

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen											
-	-	-	-	-	-	-	-	-	-	-	-	-	-
None identified in Annex B of RBMP	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Cutting		Retaining wall		Retaining wall		Impacts from other WFD water bodies (assessed separately)
	GB109054044520			Description of scheme element impact	Unnamed tributaries of Canley Brook: Rough Knowles Wood cutting, Burton Green cutting, North Crackley cutting		Canley Brook: Canley Brook Retaining Wall		Canley Brook: Burton Green retaining wall		
	Canley Brook - source to confluence with Finham Brook	Moderate	Good by 2027	Identified biological impacts	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	-	-		Potential decrease in flows on tributaries of Canley Brook during dewatering. The tributary located at chainage 145+030 is heavily shaded and supports no aquatic vegetation (HS2 baseline surveys). No baseline data available for the other tributaries. By default, temporary and localised adverse effect.	No changes in water quality expected. No likely effect anticipated on this quality element.	Potential temporary reduction in flows on headwaters and tributaries of Canley Brook. Where available, baseline data showed that Canley Brook and its tributaries support few-to-no aquatic vegetation only. By default, potential temporary adverse effect anticipated.	No significant changes in water quality expected. No likely effect anticipated on this quality element.	The water pumped from the River Blythe catchment at Burton Green retaining wall will be released on the Canley Brook catchment, upstream of the location of Canley brook retaining wall. Therefore, potential beneficial effect anticipated.	No changes in water quality expected. No likely effect anticipated on this quality element.	No scheme element on upstream water body
	3. Macroinvertebrates	Moderate	Good by 2027 ?		Potential decrease in flows on tributaries of Canley Brook during dewatering. The tributary located at chainage 143+500 currently supports moderately low macroinvertebrate quality (HS2 baseline surveys). No baseline data available for the other tributaries. By default, temporary and localised adverse effect.	No changes in water quality expected. No likely effect anticipated on this quality element.	Potential temporary reduction in flows on headwaters and tributaries of Canley Brook. Where available, baseline data showed that Canley Brook Moderate to Good and its tributaries moderately low macroinvertebrate quality. Communities were also identified to be sensitive to reduced flows. Potential temporary adverse effect anticipated at the scale of the water body.	No significant changes in water quality expected. No likely effect anticipated on this quality element.	The water pumped from the River Blythe catchment at Burton Green retaining wall will be released on the Canley Brook catchment, upstream of the location of Canley brook retaining wall. Therefore, potential beneficial effect anticipated.	No changes in water quality expected. No likely effect anticipated on this quality element.	No scheme element on upstream water body
	4. Fish	-	-		Potential decrease in flows on tributaries of Canley Brook during dewatering. No fish data available for any of the tributaries. Canley Brook currently supports brown trout population (HS2 baseline surveys). By default, temporary and localised adverse effect.	No changes in water quality expected. No likely effect anticipated on this quality element.	Potential temporary decrease in flows on tributaries of Canley Brook during dewatering. Canley Brook is a designated fisheries and supports brown trout population (HS2 baseline surveys). Potential adverse effect at the scale of the water body anticipated.	No significant changes in water quality expected. No likely effect anticipated on this quality element.	The water pumped from the River Blythe catchment at Burton Green retaining wall will be released on the Canley Brook catchment, upstream of the location of Canley brook retaining wall. Therefore, potential beneficial effect anticipated.	No changes in water quality expected. No likely effect anticipated on this quality element.	No scheme element on upstream water body
	Physico-Chemical status										
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	Potential decrease in flows on Canley Brook during dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	No changes in water quality expected. No likely effect anticipated on this quality element.	Potential temporary decrease in flows on Canley Brook during dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	No changes in water quality expected. No likely effect anticipated on this quality element.	Potential temporary increase in flows on headwaters and tributaries of Canley Brook, in a water body that has been deteriorated by abstractions. Only minor and temporary beneficial effect.	No changes in water quality expected. No likely effect anticipated on this quality element.	No scheme element on upstream water body
	6. pH	High	-		Receptor is insensitive to impact	No changes in water quality expected. No likely effect anticipated on this quality element.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No scheme element on upstream water body
	7. Phosphate	Moderate	-		Potential decrease in flows on Canley Brook during dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	No changes in water quality expected. No likely effect anticipated on this quality element.	Potential temporary decrease in flows on Canley Brook during dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	No changes in water quality expected. No likely effect anticipated on this quality element.	Potential temporary increase in flows on headwaters and tributaries of Canley Brook, in a water body that has been deteriorated by abstractions. Only minor and temporary beneficial effect.	No changes in water quality expected. No likely effect anticipated on this quality element.	No scheme element on upstream water body
	8. Ammonia	High	-		Potential decrease in flows on Canley Brook during dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	No changes in water quality expected. No likely effect anticipated on this quality element.	Potential temporary decrease in flows on Canley Brook during dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	No changes in water quality expected. No likely effect anticipated on this quality element.	Potential temporary increase in flows on headwaters and tributaries of Canley Brook, in a water body that has been deteriorated by abstractions. Only minor and temporary beneficial effect.	No changes in water quality expected. No likely effect anticipated on this quality element.	No scheme element on upstream water body
	9. Temperature	-	-		Receptor is insensitive to impact	No changes in water quality expected. No likely effect anticipated on this quality element.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No scheme element on upstream water body
	10. Specific Pollutants (Annex VIII)	-	-		Potential decrease in flows on Canley Brook during dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	No changes in water quality expected. No likely effect anticipated on this quality element.	Potential temporary decrease in flows on Canley Brook during dewatering. Embedded mitigation to reintroduce water to ground via SuDS where possible or to surface water.	No changes in water quality expected. No likely effect anticipated on this quality element.	Potential temporary increase in flows on headwaters and tributaries of Canley Brook, in a water body that has been deteriorated by abstractions. Only minor and temporary beneficial effect.	No changes in water quality expected. No likely effect anticipated on this quality element.	No scheme element on upstream water body
	Hydromorphological status										
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	The potential reduction of the groundwater contribution to surface water flows from Rough Knowles Wood cutting, Burton Green cutting, North Crackley cutting is unlikely to significantly impact the hydromorphology of the watercourse, especially considering the length of the watercourse impacted in the context of the wider catchment and water will be reintroduced to surface watercourses through SUDs.	No changes in water quality expected. No likely effect anticipated on this quality element.	• Potential temporary reduction in flows on headwaters and tributaries of Canley Brook • The Hydrology rating for Canley Brook is currently Moderate (does not support Good ecological status/potential) due to abstraction • Flow rates and dynamics could be decreased, but this would be temporary and reversible	N/A	• Potential temporary increase in flows on headwaters and tributaries of Canley Brook, in a water body that has been deteriorated by abstractions • The Hydrology rating for Canley Brook is currently Moderate (does not support Good ecological status/potential) due to abstraction • Flow rates and dynamics could be increased, presumably towards pre-abstraction regimes, but this would be temporary and reversible	N/A	No scheme element on upstream water body
	12. Connection to Groundwater	-	-				• Potential temporary reduction in flows on headwaters and tributaries of Canley Brook	N/A	• Potential temporary increase in flows on headwaters and tributaries of Canley Brook	N/A	No scheme element on upstream water body
	13. River continuity	-	-				• Continuity could be deteriorated due to the decrease in flows and potential increase in sedimentation. • Any effect would be temporary and reversible • However, the watercourses are sensitive habitats and any change could be significant	N/A	• Continuity could be improved due to the increase in flows and potential decrease in sedimentation. • Any effect would be temporary and reversible	N/A	No scheme element on upstream water body
	14. River depth and width variation bed	-	-				• Any decrease in flow depths and widths would be temporary and reversible, but this is a sensitive habitat and any effects on wetted areas could be significant	N/A	• Any increase in flow depths and widths and wetted areas is likely to be benefit this water body as a sensitive habitat, but any effects would be temporary and reversible,	N/A	No scheme element on upstream water body
	15. Structure and substrate of river bed	-	-				• Any decrease in flows and associated increase in sedimentation would be temporary and reversible, but this is a sensitive habitat for fish and invertebrates, and any effects on bed structures could be significant	N/A	• Any increase in flows and associated decrease in sedimentation, and associated effects on bed structures could be to the benefit of a sensitive habitat for fish and invertebrates, but would be temporary and reversible,	N/A	No scheme element on upstream water body
	16. Structure of riparian zone	-	-				• Any decrease in flow volumes and dynamics would be temporary and reversible, and impacts on riparian zones are unlikely to be significant	N/A	• Any increase in flow volumes and dynamics would be temporary and reversible, and impacts on riparian zones are unlikely to be significant	N/A	No scheme element on upstream water body

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen							
			-	-	-	-	-	-	-
None identified in Annex B of RBMP	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements		Additional Proposed Mitigation Measures			
					OVERALL effect on element	Construction	Operation	RESIDUAL effect on element (following any additional mitigation measures)	-
	GB109054044520	Moderate	Good by 2027	Description of scheme element impact					
	Canley Brook - source to confluence with Finham Brook			Identified biological impacts					
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	-	-		Although the river diversion on Canley Brook (500 to 900 m in total) has the potential for beneficial effects through the creation of new habitats within the diverted channels, the hydromorphological changes associated could have a permanent adverse effects on this quality element. The small culverts present on the tributaries of Canley Brook are considered of having the potential for only very localised effects. Given the relatively short length of culverted sections on the tributaries (drainage ditches), their cumulative effects are considered as negligible at the scale of the water body. However, cuttings and the retaining wall are identified as having potential adverse effects on flows on Canley Brook and its tributaries. Although Burton Green retaining wall has the potential to have a beneficial effect on flows on the Canley Brook catchment, cumulative effects from the cuttings, retaining wall and the river diversion are considered to have the potential of being adverse on this quality element at the scale of the water body. As Canley Brook and its tributaries currently supports low to no aquatic vegetation, overall effect of the scheme is however likely to be minor.	None required.	None required.	The overall effect of the scheme likely to be negligible. This quality element currently does not have a status.	-
	3. Macroinvertebrates	Moderate	Good by 2027 ?		Although the river diversion on Canley Brook (500 to 900 m in total) has the potential for beneficial effects through the creation of new habitats within the diverted channels, the hydromorphological changes associated could have a permanent adverse effects on this quality element. The small culverts present on the tributaries of Canley Brook are considered of having the potential for only very localised effects. Given the relatively short length of culverted sections on the tributaries (drainage ditches), their cumulative effects are considered as negligible at the scale of the water body. However, cuttings and the retaining wall are identified as having potential adverse effects on flows on Canley Brook and its tributaries. Although Burton Green retaining wall has the potential to have a beneficial effect on flows on the Canley Brook catchment, cumulative effects from the cuttings, retaining wall and the river diversion are considered to have the potential of being adverse on this quality element at the scale of the water body. Therefore, the scheme is considered as having the potential to lead to a deterioration of the current WFD status (Moderate) of this quality element.	Detailed design of diversion will aim to address hydromorphological impacts and ensure existing ecological communities are maintained. In addition, dewatering operations will be considered. In addition, dewatering operations for cuttings should not take place at the same time, in order to avoid cumulative effects.	None required.	Assessment will be revisited following detailed design	-
	4. Fish	-	-		Although the river diversion on Canley Brook (500 to 900 m in total) has the potential for beneficial effects through the creation of new habitats within the diverted channels, the hydromorphological changes associated could have a permanent adverse effects on this quality element. The small culverts present on the tributaries (drainage ditches) of Canley Brook are considered of having the potential for only very localised effects, in reason of their location at the very upstream end of the tributaries. However, cuttings and the Canley Brook retaining wall are identified as having potential adverse effects on flows on Canley Brook and its tributaries. Although Burton Green retaining wall has the potential to have a beneficial effect on flow on Canley Brook catchment, cumulative effects from the cuttings, retaining wall and the river diversion are considered to have the potential of being significant and adverse on this quality element at the scale of the water body.	Detailed design of diversion will aim to address hydromorphological impacts and ensure existing ecological communities are maintained. Fish rescue during dewatering operations will be considered. In addition, dewatering operations for cuttings should not take place at the same time, in order to avoid cumulative effects.	None required.	Assessment will be revisited following detailed design	-
	Physico-Chemical status								
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	Potential minor and localised effects on element.	None required.	None required.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	-
	6. pH	High	-		Receptor is insensitive to impact				
	7. Phosphate	Moderate	-		Depending on how much flow is lost, potential minor and localised effects on element. Nine sewage discharge consents to Canley Brook and its tributaries. Potential for reduced dilution potential, if a significant amount of flow is lost. This risk is flagged as having potential to have adverse effect and deteriorate phosphate status.				
	8. Ammonia	High	-		Potential minor and localised effects on element.				
	9. Temperature	-	-		Receptor is insensitive to impact				
	10. Specific Pollutants (Annex VIII)	-	-		Potential minor and localised effects on element.				
	Hydromorphological status								**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	• The diversion of Canley Brook appears to be approximately 1 km in length and therefore has the potential to have an adverse effect on WFD status classifications • The water body is approximately 11km in length, about half of which is urbanised, so a 500 – 900m diversion could potentially have adverse effects on 10 – 20% of the non-developed stream corridor • The diversion would negate the need for a culvert and is probably a more preferable option. • This risks is flagged as having potential to have adverse effect • The tributary culvert is unlikely to have significant impact on the flow dynamics of the rest of the water body, considering the size of the channel..	Hydromorphological mitigation should be incorporated into detailed design for Canley Brook diversion where practicable. Mitigation measures that might be incorporated into the detailed design include: • Create low flow channels in over-widened/over-deepened channels • Create reed fringes • Introduce riparian vegetation/green corridors where space allows • Narrow channel to sustain reach-scale flow processes • Recreate a sinuous river channel (re-meandering) as space allows • Remove weir near Stoneleigh Park if possible • Retain marginal vegetation • Use of engineering techniques to assist natural recovery • Use soft engineering techniques		Assessment will be revisited following detailed design. Potential to drop to Yellow if mitigation incorporated into detailed design.	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-						
	13. River continuity	-	-						
	14. River depth and width variation bed	-	-						
	15. Structure and substrate of river bed	-	-						
	16. Structure of riparian zone	-	-						

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	-	-	-	-	-
None identified in Annex B of RBMP	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	River Blythe Bypass Culvert						Horn Brook and Horn Brook Trib - River Diversion			Horn Brook Culvert						Including Bayleys Brook (80 m at Balsall Common viaduct), tributary of Bayleys Brook (100 m, Lavender Hall Lane), tributary of Bayleys Brook (1500 m diversion - due to construction of Marsh Farm viaduct - precise details not available)		
GB104028042571	Moderate	Good Ecological Status by 2027	Description of scheme element impact	Culvert of 'River Blythe Bypass' watercourse - a tributary of the River Blythe (Culvert: 4.5 m wide, approximately 40 m in length, precise design details not available)						Diversion of Horn Brook (approx. 150 m) and tributary of Horn Brook (approx. 75 m) - precise details of diversion not available. Horn Brook is a minor secondary trib. of the Blythe, connected via the R. Blythe Bypass.			Horn Brook, a minor tributary of the Blythe (1.8 m long, 1.8 m wide). Precise culvert design details not available, but scheme designs indicate it will be approximately 40 m in length.								
River Blythe from Temple Balsall Brook to Patrick Bridge			Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Creation of new habitats	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake leading to loss of habitat	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Creation of new habitats
WFD classification elements	1. Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A			N/A	N/A	N/A	N/A	N/A					N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	Good	Good		Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to a localised but permanent loss of habitat. The watercourse is heavily shaded by riparian vegetation in the stretch impacted and currently supports very low aquatic vegetation (ecology baseline survey). Effects on macrophytes are likely to be locally negligible. No deterioration of the element status anticipated.	Potential modification of macrophytes communities, due to reduction in photosynthetic activity. The watercourse is heavily shaded by riparian vegetation in the stretch impacted and currently supports very low aquatic vegetation (ecology baseline survey). Effects on macrophytes are likely to be locally negligible. No deterioration of the element status anticipated.	Potential increase in flow velocities and reduction of habitat continuity. The watercourse is heavily shaded by riparian vegetation in the stretch impacted and currently supports very low aquatic vegetation (ecology baseline survey). Effects on macrophytes are likely to be locally negligible. No deterioration of the element status anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in WFD element.	Temporary loss of approximately 225 m of habitats of the existing Horn Brook and its tributary that lie within the direction of the new channels re-establish. Horn Brook and its tributary are currently heavily shaded and support low aquatic vegetation within the stretch impacted (ecology baseline survey). Effect on macrophytes likely to be negligible. No deterioration of the element status anticipated.	Potential reduced flows locally, with no significant effect. Horn Brook and its tributary are currently heavily shaded and support low aquatic vegetation within the stretch impacted. Effect on macrophytes likely to be negligible to locally beneficial, with no deterioration of the element status anticipated.	The new channels will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species (precise design details not available). Horn Brook and its tributary currently support low aquatic vegetation within the stretch impacted (ecology baseline survey) will be less shaded.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to a localised but permanent loss of habitat. The stream is heavily shaded by riparian vegetation in the stretch impacted and currently supports very low aquatic vegetation (baseline survey). Effects on macrophytes are likely to be negligible. No deterioration of the element status anticipated.	Potential modification of macrophytes communities, due to reduction in photosynthetic activity. The stream is heavily shaded by riparian vegetation in the stretch impacted and currently supports very low aquatic vegetation (baseline survey). Effects on macrophytes are likely to be negligible. No deterioration of the element status anticipated.	Potential increase in flow velocities within Horn Brook, with no effect at the water body scale. The watercourse currently supports low aquatic vegetation within the stretch impacted (baseline survey). Negligible effect on macrophytes anticipated. No deterioration of the element status anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in WFD element.	Temporary loss of approximately 1800 m (precise details not available) of habitats of the existing Bayleys Brook and its tributaries (agricultural ditches) while the new channels re-establish. Bayleys Brook currently supports moderate macrophyte quality within the stretch impacted (baseline survey). No data available on tributaries. Minor, temporary and localised effect on Bayleys Brook and potential adverse effect on its tributaries. No deterioration of the element status anticipated.	Cumulative impacts likely to affect flow depths within Bayleys Brook. Bayleys Brook currently is heavily shaded and with very little aquatic vegetation within the area impacted (baseline survey). Bayleys Brook currently supports low macrophyte quality, likely to be negligible on Bayleys Brook. Minor, temporary and localised effects on the tributaries. No deterioration of the element status anticipated.	The new channels will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species (precise design details not available). Bayleys Brook currently heavily shaded and with very little aquatic vegetation within the area impacted (baseline survey). No data available on tributaries (agricultural ditches). The effect on this quality element is considered to be beneficial.
	3. Macroinvertebrates	Good	Good		Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to very localised but permanent loss of fish habitat (i.e. riparian vegetation, slow flowing areas) and reduced connectivity between the River Blythe main channel and the Bypass, considered as a feature of interest to fish (shelter, spawning). The River Blythe main channel currently supports moderately diverse and abundant fish communities, including brown trout (ecology baseline survey). However, the extent of habitat loss will be limited within the context of the wider water body and effects will be minor and spatially limited.	No additional effect anticipated (loss of habitat already included in the landtake impact).	Potential habitat diversification associated with increase in flow velocities within the bypass could be beneficial for fish, however, potential adverse effects of reduction of habitat continuity. Current macroinvertebrate quality is locally poor, with communities adapted to slow flows and sedimentation (ecology baseline survey). Neutral effect anticipated, with no deterioration of the status of the element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in WFD element.	Temporary loss of approximately 225 m of habitats of the existing Horn Brook and its tributary that lie within the direction of the new channels re-establish. Horn Brook and its tributary are currently poor and tributary supporting moderate macroinvertebrate quality (ecology baseline survey). Localised and temporary adverse effect on macroinvertebrates expected.	Potential reduced flows locally and loss of riparian connectivity with no significant effect. Macroinvertebrate quality of Horn Brook currently poor. Localised effect on macroinvertebrates on Horn Brook and its tributary likely to be negligible. No deterioration of the element status anticipated.	The river diversions will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach (precise design details not available). Macroinvertebrate quality of Horn Brook currently poor and tributary supporting moderate macroinvertebrate quality (ecology baseline survey). Localised effect on macroinvertebrates on Horn brook and its tributary likely to be beneficial. No deterioration of the element status anticipated.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to very localised but permanent loss of habitat (i.e. substrate, riparian vegetation). Macroinvertebrate quality of Horn Brook currently poor within the stretch impacted (baseline survey). Effect likely to be localised and minor, with no deterioration of the element status anticipated.	No additional effect anticipated (loss of habitat already included in the landtake impact), locally or.	Potential increase in flow velocities within Horn Brook and local discontinuity of habitat and riparian vegetation, with no effect at the water body scale. Macroinvertebrate quality of Horn Brook currently poor within the stretch impacted (baseline survey). Neutral to potentially beneficial effect if habitat diversification associated with increase in flow velocities. No change of the element status anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in WFD element.	precise details not available) of macroinvertebrate habitats on Bayleys Brook and its tributaries (agricultural ditches) while the new channels re-establish. Bayleys Brook currently supports moderate macroinvertebrate quality within the stretch impacted (baseline survey). No data available on tributaries. Minor, temporary and localised effect on Bayleys Brook and tributaries. No deterioration of the element status anticipated.	Cumulative impacts likely to affect flow depths within Bayleys Brook. Macroinvertebrate quality of Bayleys Brook locally moderate, and adopted to slow flowing conditions (baseline survey). No data available on tributaries. Potential beneficial effect anticipated on Bayleys Brook and its tributaries if habitat diversification associated with hydromorphological changes. No deterioration of the element status anticipated.	The river diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach (precise design details not available). Bayleys Brook currently supports moderate macroinvertebrate quality within the stretch impacted (baseline survey). No data available on tributaries. The effect on this quality element is considered to be beneficial.
	4. Fish	High	High		Localised and temporary adverse effect during construction and temporary deterioration of the water body status of the element is however expected.	Likely to lead to very localised but permanent loss of fish habitat (i.e. riparian vegetation, slow flowing areas) and reduced connectivity between the River Blythe main channel and the Bypass, considered as a feature of interest to fish (shelter, spawning). The River Blythe main channel currently supports moderately diverse and abundant fish communities, including brown trout (ecology baseline survey). However, the extent of habitat loss will be limited within the context of the wider water body and effects will be minor and spatially limited.	No additional effect anticipated (loss of habitat already included in the landtake impact).	Hydromorphological impact considered to be minimal although there is potential for minor increases in flow velocities due to reduced out of bank flow and smooth culvert boundaries. Culverts will be designed to maintain habitat continuity (though use of lowered bed levels and natural substrate) and reduce disconnection. However, River Blythe is of 'High' status for fish and the main channel currently supports moderately diverse and abundant fish communities, including brown trout (ecology baseline survey). As there are very limited data on fish within the bypass and given the sensitivity of the fish population in the R Blythe, adverse effects on fish and possible change in status cannot be ruled out.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in WFD element.	Temporary and localised loss of fish habitat within Horn Brook and its tributary, while the new channels re-establish. Fish kills are a known occurrence in Horn Brook and its tributary, and available for these watercourses. Effect considered to default as minor adverse, local and temporary with no deterioration of the status of this element expected at the water body scale.	Potential locally reduced flows and loss of riparian connectivity with no significant effect. No data on fish is available for Horn Brook and its tributary, considered to default as minor adverse and local with no deterioration of the status of this element expected at the water body scale.	The river diversions will be designed to include a range of channel habitats that are considered to represent an improvement for fish communities (precise design details not available). No data on fish is available for these watercourses. Locally beneficial effect anticipated, with no deterioration of the status of this element expected at the water body scale	Localised and temporary adverse effect during construction and temporary deterioration of the water body status of the element is however expected.	Likely to lead to very localised but permanent loss of fish habitat and reduced connectivity to the River Blythe. No fish data available for Horn Brook. River Blythe main channel currently supports moderately diverse and abundant fish communities, including brown trout (baseline survey). However, the effects of loss of habitat will be localised to this minor tributary and would not affect the River Blythe at a water body scale.	No additional effect anticipated (loss of vegetation already included in the landtake impact), locally or.	Hydromorphological impacts considered to be minimal but there is potential for minor, localised increases in flow velocities within Horn Brook due to reduced out of bank flows and smooth culvert boundaries. Culverts will be designed to maintain habitat continuity (though use of lowered bed levels and natural substrate) and reduce disconnection. However, River Blythe main channel currently supports moderately diverse and abundant fish communities, including brown trout (ecology baseline survey). As there are very limited data on fish within the Horn Brook and given the sensitivity of the fish population in the R Blythe, adverse effects on fish and possible change in status cannot be ruled out	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in WFD element.	Temporary loss of 1800 m (precise design details not available) of fish habitat within Bayleys Brook and its tributaries, while the new channels re-establish. Bayleys Brook currently supports moderate fish abundances and low fish diversity (baseline survey). No data available for the tributaries. Minor, localised effects anticipated on Bayleys Brook and its tributaries. No deterioration of the element status anticipated	Cumulative impacts likely to affect flow depths within Bayleys Brook. Bayleys Brook currently supports moderate fish abundances and low fish diversity (baseline survey). No data available on tributaries. Potential beneficial effects anticipated on Bayleys Brook and its tributaries if habitat diversification associated with hydromorphological changes. No deterioration of the element status anticipated	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities (precise design details not available). Bayleys Brook currently supports moderate fish abundances and low fish diversity (baseline survey). No data available on tributaries. The effect on this quality element is considered to be beneficial.
Physico-Chemical status																					
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on dissolved oxygen. The watercourse channel is locally heavily shaded and is already culverted under Diddington Lane. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be minor/temporary in relation to the water body.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor locally, with no deterioration of the element status anticipated at the scale of the water body.	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on dissolved oxygen. The watercourse channel is locally heavily shaded and is already culverted under Diddington Lane. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor locally, with no deterioration of the element status anticipated at the scale of the water body.
	6. pH	High	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact
	7. Phosphate	Moderate	-		N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be	Receptor is insensitive to impact
	8. Ammonia	High	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact
	9. Temperature	-	-		N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. The watercourse channel is locally heavily shaded and is already culverted under Diddington Lane. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. The watercourse channel is locally heavily shaded and is already culverted under Diddington Lane. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact
Hydromorphological status																					
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• Flow and diversion arrangements are not known for the bypass channel, but channel width appears to be 0.5m to 1m or less, so there is unlikely to be significant diversity of flow dynamics • Cumulative impacts may affect the River Blythe Bypass at its downstream end due to the River Blythe Bypass Culvert and Horn Brook culvert and diversion, and existing A452 and Comets End Lane culverts and Comets End Lane gravel works. • The channel does not appear to be significantly realigned but out of bank flows would be cut-off and culvert boundaries would be smooth compared to the vegetation lined channel, which may result in increased flow velocities due to increased channel gradients and decreased roughness , but in practical terms the impacts on hydromorphology are considered to be minimal	N/A	N/A	• Channel width appears to be 0.5m to 1m or less, so there is unlikely to be significant diversity of flow dynamics • Cumulative impacts may affect the River Blythe Bypass at its downstream end due to the River Blythe Bypass Culvert and Horn Brook culvert and diversion, and existing A452 and Comets End Lane culverts and Comets End Lane gravel works. • The channel realignment would lengthen Horn Brook slightly, its catchment could be cut-off by the earthworks, which may reduce flows. • In practical terms the impacts on hydromorphology are considered to be minimal at water body scale	N/A	N/A	N/A	N/A	• Channel width appears to be 0.5m to 1m or less, so there is unlikely to be significant diversity of flow dynamics • Cumulative impacts may affect the River Blythe Bypass at its downstream end due to the River Blythe Bypass Culvert and Horn Brook culvert and diversion, and existing A452 and Comets End Lane culverts and Comets End Lane gravel works. • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to the vegetation lined channel, which may result in increased flow velocities due to increased channel gradients and decreased roughness , in practical terms the impacts on hydromorphology are considered to be minimal at water body scale	N/A	N/A	• Channel widths appear to be 1m or less, so there is unlikely to be significant diversity of flow dynamics • The short channel realignments would not have significant impacts • Cumulative impacts of Bailey's Brook diversion, diversion of unnamed tributary into ditch to Marsh Farm, 1500m diversion of the unnamed tributary of Bayleys Brook, and multiple culverts on Bayleys Brook, Bailey's Brook and the tribs of Bailey's Brook, likely to be detrimental to the watercourse • The 1500m diversion along the westerly side of the raised-HS2 embankment is a major realignment and would alter flow volumes and timings in extended reaches of the tributary and Bayleys Brook, • Local place name such as Bradnock's Marsh, Marsh Farm and The Bogs suggest that the channel planform is stable in the channel local habitats are water dependent (local topography and Environmental Statements suggest reliance on soil through flow and superficial aquifers), so embankment could have detrimental impacts on local hydrology and habitats, especially in the area up to 1500m upstream of the viaduct • In practical terms the impacts on hydromorphology, are considered to be minimal at water body scale, since Bayleys
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	•Watercourse and water dependent habitats are likely to be reliant on sub-surface flows and Secondary A aquifers	N/A Diversions not large enough to be considered to create significant new habitat
	13. River continuity	-	-		N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of bank flows, bank habitats and effectively sever any existing habitat continuity, but this is a minor feature and in practical terms would not impact on deterioration of water body status	N/A	N/A	• The short diversion would not significantly affect river continuity	N/A Diversions not large enough to be considered to create significant new habitat	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of bank flows, bank habitats and effectively sever any existing habitat continuity, but this is a minor feature and in practical terms would not impact on deterioration of water body status	N/A	N/A	• Crossing design means there will be no footings in the watercourse • It is likely that floodplain and water-dependent habitat continuity would be lost due to the embankment to the south of the viaduct, although the area up to 500m upstream of the viaduct • This unlikely to have a detrimental effect at water body scale	
	14. River depth and width variation bed	-	-		N/A	N/A	N/A	• Out-of bank flows may be constrained by the culvert, but the channel water surface at the crossing location is not wide enough to be visible or measurable from aerial imagery, so there is unlikely to be significant diversity of river depth and width, and the culvert is unlikely to cause significant impacts	N/A	N/A	• Out-of bank flows may be constrained by the culvert, but the channel water surface at the crossing location is not wide enough to be visible or measurable from aerial imagery, so there is unlikely to be significant diversity of river depth and width, and the culvert is unlikely to cause significant impacts	N/A Diversions not large enough to be considered to create significant new habitat	N/A	N/A	N/A	• Out-of bank flows may be constrained by the culvert, but the channel water surface at the crossing location is not wide enough to be visible or measurable from aerial imagery, so there is unlikely to be significant diversity of river depth and width, and the culvert is unlikely to cause significant impacts	N/A	N/A	• Crossing design means there will be no footings in the watercourse • Open watercourse is very small and unlikely to have significant width and depth variation, although potential catchment cun affect flow depths, which would affect wetter channel flow depths. • Comparison of historic maps suggests that channel planform is stable in the order of decades, so no impacts are anticipated	
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• Channel water surface at the crossing location is not wide enough to be visible or measurable from aerial imagery, so there is unlikely to be significant bed substrate transport or scour. • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	N/A	• Channel water surface at the crossing location is not wide enough to be visible or measurable from aerial imagery, so there is unlikely to be significant bed substrate transport or scour. • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A Diversions not large enough to be considered to create significant new habitat	N/A	N/A	N/A	• Channel water surface at the crossing location is not wide enough to be visible or measurable from aerial imagery, so there is unlikely to be significant bed substrate transport or scour. • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	N/A	• The short diversion beneath the viaduct would not significantly affect bed conditions • The lengthy diversion is likely to alter flow dynamics, but the tributary is effectively a drainage ditch, and no diversity or high quality bed morphology would be expected	
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	• The culvert would disconnect the channel from the existing well developed, mature vegetation riparian zone and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms would not impact on deterioration of water body status	N/A	N/A	• Some riparian hydraulic connectivity and associated habitats could be lost to the embankments	N/A Diversions not large enough to be considered to create significant new habitat	N/A	N/A	N/A	• The culvert would disconnect the channel from the existing well developed, mature vegetation riparian zone and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms would not impact on deterioration of water body status	N/A	N/A	• The short diversion beneath the viaduct would not significantly affect the riparian zones	

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	Predicted change to status elements (green = none, amber = possibly, red = likely)																	
Biological sub-elements currently at high status, so no mitigation measures. Water body at moderate status due to Phosphate or Total Nitrogen	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Marsh Farm Viaduct					Balsall Common Viaduct (footings in or within riparian zone of watercourse)					Bayleys Brook/tributaries Culverts					Cutting		Cutting	
	GB104028042571	Moderate	Good Ecological Status by 2027	Description of scheme element impact	Marsh Farm Viaduct - Viaduct over Bayleys Brook (15 m wide, 5 m above ground level) - precise design details not available, but footings unlikely to be within watercourse. Plans indicate that structures may be near to marginal areas (<10 m)					Balsall Common viaduct (footings in watercourse or riparian zone) over Bayleys Brook (a tributary of the Blythe). No footings in watercourse (due to diversion), but footings in/near to riparian zone (precise design details not available).					Multiple Culverts - Bayleys Brook (3 culverts (60m) at Lavender Hall Lane diversion, new culvert (50 m at Mercote Lane/Kenilworth Road), Tributary of Bayleys Brook (90m Culvert Beechwood underpass)					Park Lane cutting - Bayleys Brook		Burton Green retaining wall - Bayleys Brook	
	River Blythe from Temple Balsall Brook to Patrick Bridge			Identified biological impacts	Vibration leading to disturbance	Landtake (for bridge footings) leading to loss of habitat and reduced connectivity	Shading leading to loss of habitats/sensitive vegetation	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Run off from bridge span resulting in changes to water quality	Vibration leading to disturbance	Landtake (for bridge footings) leading to loss of habitat and reduced connectivity	Shading leading to loss of habitats/sensitive vegetation	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Run off from bridge span resulting in changes to water quality	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	Good	Good		Receptor not sensitive to impact. No likely effect anticipated.	Footings in or near to riparian zone, but with no anticipated effect on macrophyte habitats.	Potential loss of macrophytes due to reduction in photosynthetic activity. No local data available for macrophytes. Habitat considered to be relatively common and very localised, with no change in status of this element expected.	Potential localised flow turbulences and detrimental effects on Bayleys Brook due to the construction of the viaduct, by changes in hydrology and loss of habitat continuity. No local data on macrophytes available. By default, effects considered to be adverse and localised on Bayleys Brook and limited to Bayleys Brook. No deterioration of the element status anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect macrophytes.	Receptor not sensitive to impact. No likely effect anticipated.	The short diversion of Bayleys Brook underneath the viaduct would mean footings in the watercourse will be avoided. Footings near to riparian zone, but with no anticipated effect on this WFD element.	Potential localised but permanent loss of macrophytes due to reduction in photosynthetic activity. However, Bayleys Brook currently heavily shaded and supporting very little aquatic vegetation within the area impacted. Effect on macrophytes likely to be negligible or no effect.	No significant hydromorphological change anticipated. Effect likely to be negligible/neutral on macrophytes/etc, with no deterioration of the status of this element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to loss of 200 m of macrophyte habitat at various locations on Bayleys Brook and its tributaries. No data available locally on macrophytes. By default, effect anticipated as locally adverse. Given the small contribution of the tributaries to the River Blythe, no deterioration of the element status anticipated.	Likely to lead to the loss of macrophytes, due to reduction in photosynthetic activity at various locations on Bayleys Brook and its tributaries. No data available locally on macrophytes. By default, effect anticipated as locally adverse. Given the small contribution of the tributaries to the River Blythe, no deterioration of the element status .	Potential reduction of habitat continuity, with no significant effect. No data available locally on macrophytes. By default, effect anticipated as locally adverse. Given the small contribution of the tributaries to the River Blythe, no deterioration of the element status.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	Only minor effects anticipated on base flows of Bayleys Brook. Bayleys Brook currently heavily shaded and supporting low aquatic vegetation within the area impacted. Effect likely to be negligible.	Potential minor adverse effects on water quality of Bayleys Brook. Bayleys Brook currently heavily shaded and supporting low aquatic vegetation within the area impacted. Effect likely to be negligible.	Only minor and temporary effects anticipated on base flows of Bayleys Brook. Bayleys Brook currently heavily shaded and supporting low aquatic vegetation within the area impacted. Effect likely to be only localised and negligible, with no further effect at the water body level.	Potential localised adverse effects on water quality of Bayleys Brook. Bayleys Brook currently heavily shaded and supporting low aquatic vegetation within the area impacted. Effect likely to be only localised and negligible, with no further effect at the water body level.
	3. Macroinvertebrates	Good	Good		Receptor not sensitive to impact. No likely effect anticipated.	Footings in or near to riparian zone, but with no anticipated effect on macroinvertebrate habitats.	Shade increase likely to lead to localised but permanent loss of potential macroinvertebrate habitats (i.e. macrophytes and riparian vegetation). No local data on macroinvertebrates habitats / quality available. By default, effect considered to be adverse and localised on Bayleys Brook, with no deterioration of the element status anticipated	Potential localised flow turbulences on Bayleys Brook and detrimental effect up to 500 m upstream of the viaduct, by changes in hydrology and loss of habitat continuity. No local data on macroinvertebrates available. By default, potential adverse effect limited to Bayleys Brook. No deterioration of the element status anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect invertebrates	Receptor not sensitive to impact. No likely effect anticipated.	The short diversion of Bayleys Brook underneath the viaduct would mean footings in the watercourse will be avoided. Footings near to riparian zone, but with no anticipated effect on this WFD element.	No significant effect on macrophytes anticipated (see above) therefore no likely indirect on effects on macroinvertebrates.	No significant hydromorphological change anticipated. Effect likely to be negligible/neutral on macroinvertebrates, with no deterioration of the status of this element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to permanent loss of 200 m of macroinvertebrates habitat (i.e. substrate, riparian vegetation, aquatic macrophytes) at various locations on Bayleys Brook and its tributary. Moderate macroinvertebrate quality on Bayleys Brook within the stretch impacted. Localised adverse effect anticipated on Bayleys Brook and its tributaries. Given the small contribution of the tributaries to the River Blythe, no deterioration of the element status anticipated.	No additional effect anticipated (loss of vegetation already included in the landtake impact), locally or .	Potential reduction of habitat continuity and disconnection between channel and riparian vegetation, with no significant effect. Moderate macroinvertebrate quality on Bayleys Brook on the stretch impacted, but no data available for the tributaries (baseline surveys). Localised adverse effects anticipated on Bayleys Brook and its tributaries. Given the small contribution of the tributaries to the River Blythe, no deterioration of the element status.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	Only minor effects anticipated on base flows of Bayleys Brook. No local data on macroinvertebrates habitats / quality available in the stretch impacted. Potential localised and minor adverse effect expected, with no further effect at on the status of this element.	Potential minor adverse effects on water quality of Bayleys Brook. No local data on macroinvertebrates habitats / quality available in the stretch impacted. Potential localised and minor adverse effect expected, not affecting the overall status of this element.	Only minor and temporary effects anticipated on base flows of Bayleys Brook. No local data on macroinvertebrates habitats / quality available in the stretch impacted. Potential localised and minor adverse effect expected, with no further effect at the water body level.	Potential localised adverse effects on water quality of Bayleys Brook. Bayleys Brook currently supports moderate fish abundances and low fish diversity, with no migratory fish (baseline surveys). Potential localised adverse effect expected, with no further effect at the water body level.
	4. Fish	High	High		Localised and temporary adverse effect during construction. No deterioration of the status of the element is however expected.	Footings in or near to riparian zone, but with no anticipated effect on fish.	Shade increase likely to lead to localised but permanent loss of fish habitats (i.e. riparian vegetation, marginal aquatic macrophytes). Bayleys Brook currently supports moderate fish abundances and low fish diversity. Localised adverse effect with no deterioration of the status of this element expected.	Potential localised flow turbulences on Bayleys Brook and detrimental effect up to 500 m upstream of the viaduct, by changes in hydrology and loss of habitat continuity. Bayleys Brook currently supports moderate fish abundances and low fish diversity (baseline survey). Localised adverse effect with no deterioration of the status of this element expected.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect fish.	Localised and temporary adverse effect during construction. No deterioration of the status of the element is however anticipated.	The short diversion of Bayleys Brook underneath the viaduct would mean footings in the watercourse will be avoided. Footings near to riparian zone, but with no anticipated effect on this WFD element.	No significant effect on macrophytes anticipated (see above) therefore no likely indirect on effects on fish.	No significant hydromorphological change anticipated. Effect likely to be negligible/neutral on macrophytes, with no deterioration of the status of this element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	Localised and temporary adverse effect during construction. No deterioration of the status of the element is however expected.	Likely to lead to permanent loss of 200 m fish habitat (i.e. substrate, riparian vegetation, marginal aquatic macrophytes) on Bayleys Brook and its tributaries. Bayleys Brook currently supports moderate fish abundances and low fish diversity with no migratory fish (baseline surveys). Localised adverse effect on Bayleys Brook and its tributaries are anticipated, with no effects on migratory fish or the main River Blythe. Given the fact that Bayleys Brook and its tributaries are already culverted in several location within the area, no likely deterioration of the element status is anticipated.	No additional effect anticipated (loss of vegetation already included in the landtake impact).	Likely to lead to reduction of habitat continuity and disconnection between channel and riparian vegetation. Culverts also have the potential to act as obstructions to fish movements. Although the River Blythe supports brown trout population (baseline surveys), Bayleys Brook only supports moderate fish abundances and low fish diversity and habitat, with no migratory fish (baseline surveys). Therefore only localised adverse effects anticipated on Bayleys Brook and its tributaries are anticipated, with no effects on migratory fish or the main River Blythe. Given the fact that Bayleys Brook and its tributaries are already culverted in several location within the area, no likely deterioration of the element status is anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	Only minor effects anticipated on base flows of Bayleys Brook. Bayleys Brook currently supports moderate fish abundances and low fish diversity, with no migratory fish (baseline surveys). Potential localised adverse effect expected, with no further effect at the water body level.	Potential minor adverse effects on water quality of Bayleys Brook. Bayleys Brook currently supports moderate fish abundances and low fish diversity, with no migratory fish (baseline surveys). Potential localised adverse effect expected, not affecting the status of this element.	Only minor and temporary effects anticipated on base flows of Bayleys Brook. Bayleys Brook currently supports moderate fish abundances and low fish diversity, with no migratory fish (baseline surveys). Potential localised adverse effect expected, with no further effect at the water body level.	Potential localised adverse effects on water quality of Bayleys Brook. Bayleys Brook currently supports moderate fish abundances and low fish diversity, with no migratory fish (baseline surveys). Potential localised adverse effect expected, with no further effect at the water body level.
	Physico-Chemical status																						
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen. • Crossing design is effectively an open	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	Due to the length of the culvert, there is likely to be a minor impact on dissolved oxygen. The watercourse channel is locally heavily shaded and is already culverted under Oddingcote Lane. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	Potential localised and minor adverse effect expected, not affecting the overall status of this element.	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	Potential localised and minor adverse effect expected, not affecting the overall status of this element.
	6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	7. Phosphate	Moderate	-		N/A	N/A	N/A	Effectively an open span bridge, so there would be no i	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no	N/A	N/A	N/A	Effectively an open span bridge, so there would be n	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution (localised and minor effect)	Potential localised and minor adverse effect expected, not affecting the overall status of this element.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution. Effect will be drainage consent at Barlaston.	Potential localised and minor adverse effect expected, not affecting the overall status of this element.
	8. Ammonia	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow turbulence and oxygenation, and other possible effects	Potential localised and minor adverse effect expected, not affecting the overall status of this element.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Potential localised and minor adverse effect expected, not affecting the overall status of this element.
	9. Temperature	-	-		N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. The watercourse channel is locally heavily shaded and is already culverted under Oddingcote Lane. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact.	Receptor is insensitive to impact.	Receptor is insensitive to impact	Receptor is insensitive to impact
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow turbulence and oxygenation, and other possible effects	Potential localised and minor adverse effect expected, not affecting the overall status of this element.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Potential localised and minor adverse effect expected, not affecting the overall status of this element.
	Hydromorphological status																						
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• Crossing design is effectively an open span bridge • Footings in riparian zones or floodplains could cause some local turbulence at flood flows, but would not considered to be significant • Crossing design is effectively an open span bridge are very close to the watercourse and appear to be in Flood Zone 3 (functional floodplain), so this may affect flow dynamics due to severing floodplain connectivity • Local place name such as Bradnock's Marsh, Marsh Farm and The Bogs suggest that surface watercourses and out-of-channel local habitats are water dependent (local topography and geology/hydrogeology suggests reliance on soil through flow and superficial aquifers), so embankment could have detrimental impacts on local hydrology and habitats, especially in the area up to 500m upstream of the viaduct. • Cumulative impacts of Bayleys Brook diversion, diversion of unnamed tributary into ditch to Marsh Farm and multiple culverts on Bayleys Brook, and earthworks at Marsh Lane Farm are likely to be detrimental to the watercourse • The watercourse is small (the water surface is not visible or measurable from aerial imagery) so at water body scale the effects may not be significant, but this is still considered to be a risk	N/A	N/A	N/A	N/A	N/A	• Crossing design is effectively an open span bridge • Footings in riparian zones or floodplains could cause some local turbulence at flood flows, but would not considered to be significant • The watercourse is small (the water surface is not visible or measurable from aerial imagery) so at water body scale the effects may not be significant, but this is still considered to be a risk	N/A	N/A	N/A	N/A	• Channel width appears to be 1m or less, so there is unlikely to be significant diversity of flow dynamics • Cumulative impacts of Bayleys Brook diversion, diversion of unnamed tributary into ditch to Marsh Farm and multiple culverts on Bayleys Brook, and earthworks at Marsh Lane Farm are likely to be detrimental to the watercourse • In practical terms the impacts on hydromorphology are considered to be minimal at water body scale, since Bayleys Brook is a minor tributary to the River Blythe	N/A	• Reduction of flows in Bayley's Brook could cause a localised reduction in flow volumes, depths and dynamics, and consequent reductions in sediment transport and increased sedimentation (and changes to habitats) of out-of-channel habitat connectivity. The effect could be significant for this watercourse, but given its size it would be buffered as soon as the tributary connects to the larger downstream watercourse so there would not be severe effects at water body scale	N/A	• Reduction of flows in Bayley's Brook could cause a localised reduction in flow volumes, depths and dynamics, and consequent reductions in sediment transport and increased sedimentation (and changes to habitats) of out-of-channel habitat connectivity. The effect could be significant for this watercourse, but given its size it would be buffered as soon as the tributary connects to the larger downstream watercourse so there would not be severe effects at water body scale	N/A
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	•Watercourse and water dependent habitats are likely to be reliant on sub-surface flows and Secondary A aquifers	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A			N/A
	13. River continuity	-	-		N/A	N/A	N/A	• Crossing design means there will be no footings in the watercourse • It is likely that floodplain and water-dependent habitat continuity would be lost due to the embankment to the south of the crossing, particularly in the area up to 500m upstream of the viaduct • This unlikely to have a detrimental effect at water body scale	N/A	N/A	N/A	N/A	• Crossing design means there will be no footings in the watercourse, and the size of the stream suggests that floodplain inundation and out of channel flows would be unlikely to be significantly affected at local or water body scale	N/A	N/A	N/A	N/A	• The culverts would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever any existing habitat continuity, but this is a minor tributary and in practical terms would not impact on deterioration of water body status	N/A			• Reduction of flows in Bayley's Brook could cause a localised reduction in flow volumes, depths and dynamics, and consequent reductions in sediment transport and increased sedimentation (and changes to habitats) of out-of-channel habitat connectivity. The effect could be significant for this watercourse, but given its size it would be buffered as soon as the tributary connects to the larger downstream watercourse so there would not be severe effects at water body scale	N/A
	14. River depth and width variation bed	-	-		N/A	N/A	N/A	• Crossing design means there will be no footings in the watercourse • Open watercourse is very small and unlikely to have significant width and depth variation, although potential catchment cut-off by the embankment could affect watercourse flow depths • Comparison of historic maps suggests that channel planform is stable in the order of decades, so no impacts are anticipated	N/A	N/A	N/A	N/A	• Crossing design means there will be no footings in the watercourse • Open watercourse is very small and unlikely to have significant width and depth variation, although potential catchment cut-off by the embankment could affect watercourse flow depths • Comparison of historic maps suggests that channel planform is stable in the order of decades, so no impacts are anticipated	N/A	N/A	N/A	N/A	• Out of bank flows may be constrained by the culvert, but the channel water surface at the crossing location is not wide enough to be visible or measurable from aerial imagery, so there is unlikely to be significant diversity of river depth and width, and the culvert is unlikely to cause significant impacts	N/A				N/A
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• Crossing design is effectively an open span bridge , so there would be no impact on the channel bed	N/A	N/A	N/A	N/A	• Crossing design is effectively an open span bridge , so there would be no impact on the channel bed	N/A	N/A	N/A	N/A	• Channel water surface at the crossing locations is not wide enough to be visible or measurable from aerial imagery, so there is unlikely to be significant bed substrate transport or scour. • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A				N/A
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	• Footings in the riparian zones would require minor land take but not considered to be significant	N/A	N/A	N/A	N/A	• Footings in the riparian zones would require minor land take but not considered to be significant	N/A	N/A	N/A	N/A	• The culverts would disconnect the channel from the existing well developed, mature riparian habitats and will sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms would not impact on deterioration of water body status	N/A				N/A

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	Predicted change to status elements (green = none, amber = possibly, red = likely)																				
Biological sub-elements currently at high status, so no mitigation measures. Water body at moderate status due to Phosphate or Total Nitrogen (N)	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Impacts from other WFD water bodies (assessed separately)	OVERALL impact on element	Additional Mitigation Measures		Residual impact	
							Construction	Operation		
	GB104028042571	Moderate	Good Ecological Status by 2027	Description of scheme element impact						
	River Blythe from Temple Balsall Brook to Patrick Bridge			Identified biological impacts						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	
	2. Macrophytes and phytobenthos - macrophytes	Good	Good		No scheme elements on upstream water bodies	Three scheme elements are identified as having adverse effects on macrophytes. However, these adverse effects are likely to be only very localised around the scheme element (i.e. culverts, viaducts) and/or temporary with a few potential beneficial effects in the longer term (i.e. river diversions, culvert removal), notably via habitat creations. In addition, most of the scheme elements are impacting relatively small watercourses at the scale of the water body while the River Blythe main channel main watercourse within this water body is crossed by one 15 m wide clear span viaduct. Therefore, cumulative impacts are not considered to have the potential to lead to the deterioration of the status of the macrophytes WFD element at the water body scale. Overall, the scheme, as currently designed, is unlikely to lead to the deterioration of the macrophytes WFD status of the water body.	No additional mitigation required	No additional mitigation required	Minor and localised effects	
	3. Macroinvertebrates	Good	Good		No scheme elements on upstream water bodies	Nine scheme elements are identified as having potential adverse effects on macroinvertebrates. However, these adverse effects are likely to be only very localised around the scheme element (i.e. culverts, viaducts, cutting) and/or temporary (river diversion, retaining wall), with also a few potential beneficial effects in the longer term (i.e. river diversions, culvert removal). In addition, most of the scheme elements are impacting relatively small tributaries at the scale of the water body, while the River Blythe, main watercourse within this water body, is crossed by one 15 m wide clear span viaduct. Therefore, and as cumulative impacts are not considered as having a significant effect on hydromorphology, they are not considered to have the potential to deteriorate the macroinvertebrates current status of the water body. Overall, the scheme, as currently designed, is unlikely to lead to the deterioration of the macroinvertebrate WFD status of the water body.	No additional mitigation required	No additional mitigation required	Minor and localised effects	
	4. Fish	High	High		No scheme elements on upstream water bodies	Nine scheme elements (1 culverts, 2 river diversions, 2 viaduct footings, one cutting and one retaining wall) and are described as having the potential for adverse effects on fish. Of these 2 culverts are considered to have the potential for adverse effects which may affect the status class for the fish sub element. Although culverts are only on minor tributaries and river diversions will be designed to maximise habitat connectivity there remains a risk that in combination the structures will impede fish migration, particularly given the sensitivity of fish populations on the River Blythe (which currently supports a population of lamper brook). These effects are most likely to occur during the construction stage whilst the new channel and bed habitats are establishing. Therefore, the deterioration of the fish status of the River Blythe water body cannot be ruled out.	Surveys of the R Blythe bypass channel and the Horn Brook will be undertaken during the detailed design stage in order to establish the baseline fish population. An assessment of the culverts with relation to flows and fish passage must be included as part of the detailed design development. Culvert lengths, gradients, baffle locations and bed material (to create low flow channels) and banks) will be developed in detail. Culvert designs will be agreed with the Environment Agency. Consideration will be given to culvert designs that are not obstructive to fish (e.g. open arch culverts, to maintain a natural bed). During dewatering of water bodies, fish rescue to be carried out.	- Culverts on Horn Brook, the River Blythe bypass and Bayleys Brook and its tributaries to be regularly maintained and kept in a functional state that allows fish movements. -Construction and post-construction monitoring should be considered (if necessary) to assess any effects on fish migration.	Provided that mitigation measures are implemented as described, there would not be an effect on the WFD status of this element at the water body level.	
	Physico-Chemical status									
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	No scheme elements on upstream water bodies	Potential minor and localised effects on element.	No additional mitigation required	No additional mitigation required	Minor and localised effects	
	6. pH	High	-		No scheme elements on upstream water bodies	Receptor is insensitive to impact			No significant effects	
	7. Phosphate	Moderate	-		No scheme elements on upstream water bodies	Depending on how much flow is lost, potential minor and localised effects on element. Water quality could be reduced in the depleted reaches of Bayleys Brook due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution. STW with discharge consent at Berkswell on Bayleys Brook.			Minor and localised effects	
	8. Ammonia	High	-		No scheme elements on upstream water bodies	Potential minor and localised effects on element.			Minor and localised effects	
	9. Temperature	-	-		No scheme elements on upstream water bodies	Receptor is insensitive to impact			No significant effects	
	10. Specific Pollutants (Annex VIII)	High	-		No scheme elements on upstream water bodies	Potential minor and localised effects on element.			Minor and localised effects	
	Hydromorphological status									Hydromorphology Baseline
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	No scheme elements on upstream water bodies	The cumulative impacts of channel diversions, culverts, dewatering are likely to result in localised deteriorations in hydromorphology, but these are only likely to be minor. It may be that the distance between the impacts means that they do not cascade into each other and there are no cumulative effects, but the number of design elements within the water body means this needs to be flagged as a risk to hydrological and sediment regimes	• No additional mitigation is required for viaducts or underbridges • Hydromorphological surveys to be undertaken to aid detailed design development • Hydromorphological mitigation should be included into detailed design where practicable, for example with respect to bank reprofiling (rehabilitation), bed morphology and use of soft engineering techniques • The reinstated riparian zones at the site of the culvert removal should be planted with the same species that exist in the adjacent areas to encourage natural recovery		Minor and localised effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		No scheme elements on upstream water bodies					
	13. River continuity	-	-		No scheme elements on upstream water bodies					
	14. River depth and width variation bed	-	-		No scheme elements on upstream water bodies					
	15. Structure and substrate of river bed	-	-		No scheme elements on upstream water bodies					
	16. Structure of riparian zone	-	-		No scheme elements on upstream water bodies					

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen					
Biological sub-elements currently at high status, so no mitigation measures. Water body at moderate status due to Phosphate or Total Phosphate (GEP)	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements (black text = proposed within groundwater body, yellow text = mitigation)	River Blythe Viaduct (clear span)					Hollywell Brook River Diversion			Hollywell Brook Underbridge					Existing culvert removed - Hollywell Brook				
GB104028042572	Moderate	Good ecological status by 2027	Description of scheme element impact	River Blythe Viaduct (399 m long, 15 m wide, 5 m above ground level)					Diversion of 330m of Hollywell Brook, including Hollywell Brook underbridge (see following column), and one people mover crossing - viaduct, approx. 5m wide)			Bridge over Hollywell Brook, a tributary of the Blythe. Bridge with footings/structures near to riparian zone but no within the channel or marginal zone. Bridge dimensions: 60 m long, 2.7 m high, 13.5 wide. Approximately 80 m length of diverted watercourse covered. Openings in bridge over watercourse to north and south of tracks to let more light in.					Removal of an existing culvert on Hollywell Brook (40 min length)				
River Blythe from Patrick Bridge to River Tame			Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Creation of new habitats	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	Moderate	Good		Receptor not sensitive to impact. No likely effect anticipated.	No bridge footings within the watercourse or riparian zone. No likely effect anticipated.	Likely to lead to a very localised but permanent loss of macrophytes by reduction of photosynthetic activity. The watercourse locally supports moderately abundant and diverse aquatic vegetation (baseline surveys). Localised adverse effect anticipated.	No significant hydromorphological changes. No likely effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Temporary loss of 330 m of macrophyte habitat on the existing Hollywell Brook while the new channel fully establishes (although the new channel will be created and some establishment will occur prior to loss of existing channel). The watercourse currently supports dense and moderately diverse aquatic vegetation in the stretch impacted (H32 baseline surveys), although there are some existing culverts. None of the species recorded are rare or notable, and it is anticipated that the macrophyte community will re-establish within 1 to 2 years of completion of the river diversion. Minor, localised adverse effect expected.	Hydromorphological impacts are considered to be minor. The watercourse currently supports dense and moderately diverse aquatic vegetation in the stretch impacted (baseline surveys). Localised adverse effect expected, with no deterioration of the status of this element.	The new channels will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species, excepted within the culverted area (detailed design of diverted section not available). The watercourse currently supports dense and moderately diverse aquatic vegetation in the stretch impacted (baseline surveys). Overall beneficial effect anticipated, with no degradation of the element status at the scale of the water body.	Receptor not sensitive to impact. No likely effect anticipated.	Footings in or near to riparian zone, but with no anticipated effect on macrophyte habitats.	Potential localised but permanent loss of macrophytes due to reduction in photosynthetic activity. However, Shadow Brook currently heavily shaded and supporting very little aquatic vegetation within the area impacted. Effect on macrophytes likely to be negligible or no effect.	No significant hydromorphological change anticipated. Effect likely to be negligible/neutral on macrophytes, with no deterioration of the status of this element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to localised increase in habitat available to macrophytes. Hollywell Brook currently supports dense and moderately diverse aquatic vegetation in the stretch impacted (baseline surveys). Very localised beneficial effect expected.	Likely to lead to local decrease of the channel shading, and development of macrophytes by increase in photosynthetic activity. Hollywell Brook currently supports dense and moderately diverse aquatic vegetation in the stretch impacted (baseline surveys). Very localised beneficial effect expected, with no incidence on the status of the element at the scale of the water body.	Potential restoration of natural flow conditions is likely to have a minor, localised beneficial effect on macrophytes locally in the long term.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.
	3. Macroinvertebrates	High	High		Receptor not sensitive to impact. No likely effect anticipated.	No bridge footings within the watercourse or riparian zone. No likely effect anticipated.	Likely to lead to a very localised but permanent loss of macroinvertebrate habitat (i.e. riparian vegetation, aquatic vegetations). The River Blythe locally supports good to very good macroinvertebrate quality within the stretch impacted (baseline surveys). Minor and localised adverse effect anticipated.	No significant hydromorphological changes. No likely effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Temporary loss of 330 m of macroinvertebrate habitat while the new channel establishes, although the new channel will be established prior to diversion of the existing channel. The watercourse currently supports dense and moderately diverse aquatic vegetation and good macroinvertebrate quality in the stretch impacted (H32 baseline surveys). Temporary adverse effects on macroinvertebrates may occur.	Hydromorphological impacts are considered to be minor. The watercourse currently supports relatively diverse macroinvertebrate communities, adapted to slow to moderate flows and moderate sedimentation (H32 baseline surveys). The predicted hydromorphological regime in the diversion is expected to support a similar macroinvertebrate assemblage. Localised minor adverse effect expected	The river diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach, excepted within the culverted area. The watercourse currently supports dense and moderately diverse aquatic vegetation and good macroinvertebrate quality in the stretch impacted (baseline surveys). Overall beneficial effect anticipated, with no degradation of the element status at the scale of the water body.	Receptor not sensitive to impact. No likely effect anticipated.	Footings in or near to riparian zone, but with no anticipated effect on macroinvertebrate habitats.	No significant effect on macrophytes anticipated (see above) therefore no likely indirect on effects on macroinvertebrates.	No significant hydromorphological change anticipated. Effect likely to be negligible/neutral on macroinvertebrates, with no deterioration of the status of this element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	Receptor not sensitive to impact.	Likely to lead to localised increase in habitats available to macroinvertebrates (i.e. macrophytes, riparian vegetation). Hollywell Brook locally supports good macroinvertebrate quality (baseline surveys). Very localised beneficial effect expected.	Likely to lead to local decrease of the channel shading, and development of macrophytes by increase in photosynthetic activity. However this would have very minor or negligible effects on macroinvertebrates.	Potential restoration of natural flow conditions, increase in bank continuity and riparian habitat continuity are likely to have a minor and localised beneficial effect on macroinvertebrates in the long term, although potential increase in sediment deposition would be detrimental in the medium term.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.
	4. Fish	High	High		Localised and temporary effect during construction. No deterioration of the water body status of the element is however expected.	No bridge footings within the watercourse or riparian zone. No likely effect anticipated.	Likely to lead to local and permanent loss of potential fish habitat (i.e. aquatic vegetation, riparian vegetation). The watercourse locally supports relatively abundant and diverse aquatic vegetation, and abundant and diverse fish populations (baseline surveys). Possible minor and local adverse effects due to loss of macrophytes.	No significant hydromorphological changes. No likely effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Temporary loss of 330 m of fish habitat within Hollywell Brook, although the new channel will be established prior to diversion of the existing channel. The watercourse currently supports diverse and relatively dense fish populations (baseline surveys). In addition, the River Blythe supports brown trout population (baseline surveys). A localised adverse effect is expected on Hollywell Brook. However, as the watercourse is already culverted in several locations, the culvert will not have the potential to deteriorate the current element status at the scale of the water body.	Hydromorphological impacts are considered to be minor, although there may be localised changes in flows velocities. The watercourse currently supports diverse and relatively dense fish populations (baseline surveys). Localised adverse effect anticipated.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities (detailed design of diversion not available). The watercourse currently supports diverse and relatively dense fish populations (baseline surveys). In addition, the River Blythe supports brown trout population (baseline surveys). Overall beneficial effect anticipated, with no degradation of the element status at the scale of the water body.	Localised and temporary adverse effect during construction. No deterioration of the status of the element is however expected.	Footings in or near to riparian zone, but with no anticipated effect on fish.	No significant effect on macrophytes anticipated (see above) therefore no likely indirect on effects on fish.	No significant hydromorphological change anticipated. Effect likely to be negligible/neutral on macrophytes, with no deterioration of the status of this element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	Localised and temporary effect during construction. No deterioration of the status of the element is however expected.	Likely to lead to localised increase in habitats available to fish (i.e. macrophytes, riparian vegetations), and to improve connectivity. Hollywell Brook locally supports relatively diverse and dense fish populations (baseline surveys). Due to the presence of migratory brown trout within the River Blythe, the effect is likely to be beneficial.	Likely to lead to local decrease of the channel shading, and development of macrophytes by increase in photosynthetic activity. However this would have very minor or negligible effects on fish.	Potential restoration of natural flow conditions and increase in bank continuity and riparian habitat continuity is likely to have a minor and localised beneficial effect on fish in the long term, although potential increase in sediment deposition would be detrimental in the medium term.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.

Physico-Chemical status

WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• Some shading with negligible/no effects.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor-locally, with no degradation of the element status anticipated at the scale of the water body.	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on dissolved oxygen. The watercourse channel is locally heavily shaded and is already culverted under Diddington Lane. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	• Culvert removal would eliminate artificial shading on this section of the watercourse, increasing dissolved oxygen levels as a result of photosynthetic organisms. A minor beneficial effect.	Receptor is insensitive to impact	Receptor is insensitive to impact
	6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	7. Phosphate	Moderate	-		N/A	N/A	N/A	tively an open span bridge, so there would be	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge so there would be no impact on phosphate.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	8. Ammonia	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	9. Temperature		-		N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	Some shading from the viaduct and underbridge may have a minor impact on water temperature, but this is likely to be a small, localised effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. The watercourse channel is locally heavily shaded and is already culverted under Diddington Lane. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	• Culvert removal would eliminate artificial shading on this section of the watercourse, returning to a natural temperature range. A minor beneficial effect.	Receptor is insensitive to impact	Receptor is insensitive to impact
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge so there would be no impact on specific pollutants.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact

Hydromorphological status

WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• Crossing design is effectively an open span bridge • Footings in riparian zones or floodplains could cause some local turbulence at flood flows, but would not considered to be significant • The river appears to be in the north of the floodplain, so some floodplain continuity would be lost due to the embankment to the south of the crossing, but this is unlikely to significantly affect flow dynamics	N/A	• Channel widths appear to be 1m or less, so there is unlikely to be significant diversity of flow dynamics in any of the channels • Diverting Hollywell Brook for this extent around a balancing pond may reduce flow rates as a result of channel lengthening, although the diversion is not far from the existing channel course • The pond would presumably mitigate any effects of dewatering resulting from cuttings • The people mover crossing design is effectively an open span bridge • Footings in riparian zones or floodplains could cause some local turbulence at flood flows, but would not considered to be significant • In practical terms the impacts on hydromorphology are considered to be minimal at water body scale, since these tributary watercourses are small in scale relative to the whole water body	• The extent of new watercourse that would be created, and the possible negative effects of altering existing channel conditions, mean that there would be no significant habitat creation	N/A	N/A	N/A	• Channel widths appear to be 1m or less, so there is unlikely to be significant diversity of flow dynamics in any of the channels • Extreme flood flows could be cut-off by the embankments, but the underbridge is 10-15m wide compared to a ca. 1m wide watercourse, so this is unlikely to be significant • Vegetation management may be required through the underbridge to maintain out-of-channel roughness and maintain peak flood conveyance, but the dimensions of the underbridge relative to the watercourse mean that hydrodynamic effects are unlikely to be significant • In practical terms the impacts on hydromorphology are considered to be minimal at water body scale, since these tributary watercourses are small in scale relative to the whole water body	N/A	N/A	N/A	N/A	• Deculverting is a major WFD benefit and would serve to reinstate natural out of bank flow dynamics, by removing flow constraints	N/A
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A
	13. River continuity	-	-		N/A	N/A	N/A	• Crossing design means there will be no footings in the watercourse • Footings in riparian zones or floodplains would not interrupt continuity • The river appears to be in the north of the floodplain, so some floodplain continuity would be lost due to the embankment to the south of the crossing, but the is unlikely to have a detrimental effect at water body scale	N/A	• Lengthening the channel may result in reduced flow rates and depths and may promote some increased sediment deposition, so there are likely to be some localised impacts on continuity		N/A	N/A	N/A	• Channel width, depth, sinuosity and bed structures would generally be maintained through the underbridge	N/A	N/A	N/A	N/A	• Culvert removal would renaturalise floodplain and out-of-bank flows, and restore continuity of bank and riparian habitats.	N/A
	14. River depth and width variation bed	-	-		N/A	N/A	N/A	• Crossing design means there will be no footings in the watercourse • Comparison of historic maps suggests that channel planform is stable in the order of decades, so no impacts are anticipated	N/A	• Lengthening the channel may result in decreased flow depths, although channel widths would be maintained		N/A	N/A	N/A	• Channel width, depth and sinuosity would generally be maintained through the underbridge, but lengthening the channel may result in decreased flow depths.	N/A	N/A	N/A	N/A	• Culvert removal would renaturalise in-channel and out-of-channel flow geometry • Removal of hard engineering may result in some channel vertical and lateral adjustment and allow recover of natural geometry by natural scour • Given the size of the watercourse, any adjustments would be minor and would not be considered to result in significant change in channel planform or increased range at other structures in	N/A
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• Crossing design is effectively an open span bridge , so there would be no impact on the channel bed	N/A	• Channel water surface at the crossing location is 1m wide or less, so there is unlikely to be dynamic bed substrate transport or scour • Lengthening the channel may result in decreased flow rates and some increased sediment deposition • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk • The people mover crossing design is effectively an open span bridge so would not affect depth and width variation		N/A	N/A	N/A	• Channel water surface at the crossing location is 1m wide or less, so there is unlikely to be dynamic bed substrate transport or scour • It is assumed that there would be no base to the underbridge so there should be no impacts on the bed	N/A	N/A	N/A	N/A	• Some local sediment mobilisation and deposition may occur as the channel is allowed to recover a natural form. This would probably be a short to medium term adjustment (storm scale to several years, since it is a small low power stream) • Given the size of the watercourse, any adjustments to channel grading would be minor, e.g. no significant headward erosion or upstream knick point migration would be anticipated	N/A
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	• Footings in the riparian zones would require minor land take but not considered to be significant	N/A	N/A	• Riparian zones could generally be maintained along the diversion		N/A	N/A	N/A	• Riparian zones could generally be maintained through the wide underbridge. The watercourse currently supports dense and moderately diverse aquatic vegetation in the stretch impacted (baseline surveys). Localised adverse effect expected, with no deterioration of the status of this element.	N/A	N/A	N/A	N/A	• Removal of the culvert would allow the recovery of well developed, mature vegetation that exists either side of the culvert, although this would take several years and should be encourage by planting	N/A

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen																			
NONE	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements (black text = proposed within groundwater body, yellow text = mitigation measure)	People mover crossings (viaduct)					Shadow Brook Underbridge					Culvert and Diversion - Trib Hollywell Brook				
GB104028042572	Moderate	Good ecological status by 2027	Description of scheme element impact	Two crossings of Hollywell Brook for people mover crossing, no footings in watercourse. Both crossings approx. 10 m long.					Bridge over Shadow Brook, a minor tributary of the Blythe. Bridge with footings/structures near to riparian zone but no within the channel or marginal zone. Bridge dimensions: 35 m long, 2.7 m high, 13.5 wide. Approximately 50 m length of watercourse covered, no modifications to course of Shadow Brook.					Tributary of Hollywell Brook (100 m length, including culvert - eastway overbridge, detailed design not available, but will follow best practice for diversions and culverts, as set out in the general assumptions).				
River Blythe from Patrick Bridge to River Tame			Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Shading	Landtake	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Creation of new habitats
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	Moderate	Good		Receptor not sensitive to impact. No likely effect anticipated.	No bridge footings within the watercourse or riparian zone. No likely effect anticipated.	Likely to lead to a very localised but permanent loss of macrophytes by reduction of photosynthetic activity. The watercourse currently supports dense and moderately diverse aquatic vegetation in the stretch impacted (baseline surveys). Localised minor adverse effect expected, with no deterioration of the status of the element at the scale of the water body.	Hydromorphological changes considered to be insignificant. No likely effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Receptor not sensitive to impact. No likely effect anticipated.	Footings in or near to riparian zone, but with no anticipated effect on macrophyte habitats.	Potential localised but permanent loss of macrophytes due to reduction in photosynthetic activity. However, Shadow Brook currently heavily shaded and supporting very little aquatic vegetation within the area impacted. Effect on macrophytes likely to be negligible or no effect.	No significant hydromorphological change anticipated. Effect likely to be negligible/neutral on macrophytes, with no deterioration of the status of this element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	Receptor not sensitive to impact. No likely effect anticipated.	Potential modification of macrophytes communities, due to reduction in photosynthetic activity. No macrophyte data available locally on the watercourse (agricultural ditch). By default, localised adverse effect expected, with no deterioration of the status of the element	Temporary loss of 100 m of habitat on the tributary while the new channel re-establishes. In addition, the culvert on the new channel will lead to very localised loss of habitat available to macrophytes. No macrophyte data available locally on the watercourse (agricultural ditch). By default, localised adverse effect expected, with no deterioration of the status of the element.	Hydromorphological changes considered to be insignificant. No likely effect anticipated.	The new channels will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species, excepted within the culverted area (detailed design of diversion not available). No macrophyte data available locally on the watercourse (agricultural ditch). Minor/local overall beneficial effect anticipated.
	3. Macroinvertebrates	High	High		Receptor not sensitive to impact. No likely effect anticipated.	No bridge footings within the watercourse or riparian zone. No likely effect anticipated.	Likely to lead to a very localised but permanent loss of macroinvertebrates habitat (i.e. riparian vegetation, aquatic vegetation). The watercourse currently supports dense and moderately diverse aquatic vegetation and good macroinvertebrate quality in the stretch impacted (baseline surveys). Localised minor adverse effect expected, with no deterioration of the status of the element at the scale of the water body.	Hydromorphological changes considered to be insignificant. No likely effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Receptor not sensitive to impact. No likely effect anticipated.	Footings in or near to riparian zone, but with no anticipated effect on macroinvertebrate habitats.	No significant effect on macrophytes anticipated (see above) therefore no likely indirect on effects on macroinvertebrates.	No significant hydromorphological change anticipated. Effect likely to be negligible/neutral on macroinvertebrates, with no deterioration of the status of this element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	Receptor not sensitive to impact. No likely effect anticipated.	No additional effect anticipated (loss of vegetation already considered in the landtake impact).	Temporary loss of 100 m of habitat on the tributary while the new channel re-establishes. In addition, the culvert on the new channel will lead to very localised loss of habitat available to macroinvertebrates. No macroinvertebrates data available locally on the watercourse (agricultural ditch). By default, localised adverse effect expected, with no deterioration of the status of the element.	Hydromorphological changes considered to be insignificant. No likely effect anticipated.	The river diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach, excepted within the culverted area (detailed design of diversion not available). No macroinvertebrates data available locally on the watercourse (agricultural ditch). Minor/local overall beneficial effect anticipated
	4. Fish	High	High		Localised and temporary effect during construction. No deterioration of the water body status of the element is however expected.	No bridge footings within the watercourse or riparian zone. No likely effect anticipated.	Likely to lead to local and permanent loss of potential fish habitat (i.e. aquatic vegetation, riparian vegetation). The watercourse currently supports diverse and relatively dense fish populations (baseline surveys). Localised minor adverse effect anticipated, with no deterioration of the status of the element at the scale of the water body.	Hydromorphological changes considered to be insignificant. No likely effect anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Localised and temporary adverse effect during construction. No deterioration of the status of the element is however expected.	Footings in or near to riparian zone, but with no anticipated effect on fish.	No significant effect on macrophytes anticipated (see above) therefore no likely indirect on effects on fish.	No significant hydromorphological change anticipated. Effect likely to be negligible/neutral on macrophytes, with no deterioration of the status of this element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality that would affect this element.	Localised and temporary adverse effect during construction. No deterioration of the water body status of the element is however expected.	No additional effect anticipated (loss of vegetation already considered in the landtake impact).	Temporary loss of 100 m of habitat on the tributary while the new channel re-establishes. In addition, the culvert on the new channel will lead to very localised loss of habitat available to macrophytes. No fish data available locally on the watercourse (agricultural ditch). By default, localised adverse effect expected, with no deterioration of the status of the element.	Hydromorphological changes considered to be insignificant. No likely effect anticipated.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities (detailed design of diversion not available). However, the culvert will also reduce habitat connectivity and constitute a barrier to fish movements. No fish data available locally on the watercourse (agricultural ditch). Overall effect likely to be neutral, with no degradation of the element status anticipated.
Physico-Chemical status																		
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on dissolved oxygen. The watercourse channel is locally heavily shaded and is already culverted under Doddington Lane. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.			N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Hydromorphological changes considered to be insignificant. No likely effect anticipated.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor locally, with no degradation of the element status anticipated at the scale of the water body.
	6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact				N/A	Receptor is insensitive to impact	Receptor is insensitive to impact
	7. Phosphate	Moderate	-		N/A	N/A	N/A	y an open span bridge, so there would	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact			N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Hydromorphological changes considered to be insignificant. No likely effect anticipated.	Receptor is insensitive to impact
	8. Ammonia	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact				N/A	Receptor is insensitive to impact	Receptor is insensitive to impact
	9. Temperature		-		N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. The watercourse channel is locally heavily shaded and is already culverted under Doddington Lane. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact				• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.			N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Hydromorphological changes considered to be insignificant. No likely effect anticipated.	Receptor is insensitive to impact
Hydromorphological status																		
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• Channel widths appear to be 1m or less, so there is unlikely to be significant diversity of flow dynamics in any of the channels • The people mover crossing design is effectively an open span bridge • Footings in riparian zones or floodplains could cause some local turbulence at flood flows, but would not considered to be significant • In practical terms the impacts on hydromorphology are considered to be minimal at water body scale, since these watercourses are very small in scale relative to the whole water body	N/A	N/A	N/A	N/A	• Channel width appear to be 2m or less, so there is unlikely to be significant diversity of flow dynamics • The bridge would be 13.5 wide to permit space for hydromorphological processes • Extreme floodplain flows could be cut-off by the embankments, but the bridge is wide enough that this would unlikely to occur at this point • In practical terms the impacts on hydromorphology are considered to be minimal at water body scale	N/A	N/A	N/A	N/A	• Channel widths appear to be 0.5m to 1m or less, so there is unlikely to be significant diversity of flow dynamics in any of the channels • The underbridge is effectively an open span bridge and would not significantly affect hydromorphology • In practical terms the impacts on hydromorphology are considered to be minimal at water body scale, since these watercourses are very small in scale relative to the whole water body	N/A	• The extent of new watercourse that would be created, and the possible negative effects of altering existing channel conditions, mean that there would be no significant habitat creation
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	
	13. River continuity	-	-		N/A	N/A	N/A	• The people mover crossing design is effectively an open span bridge , so would not affect continuity	N/A	N/A	N/A	N/A	• The underbridge is wide enough to effectively be considered open span, and no impacts on continuity are anticipated	N/A	N/A	N/A	N/A	• Size of the tributary means that no significant effects would be anticipated	
	14. River depth and width variation bed	-	-		N/A	N/A	N/A	• The people mover crossing design is effectively an open span bridge so would not affect depth and width variation	N/A	N/A	N/A	N/A	• The underbridge is wide enough to have no significant impact on channel geometry	N/A	N/A	N/A	N/A	• Size of the tributary means that no significant effects would be anticipated	
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• The people mover crossing design is effectively an open span bridge so would not affect depth and width variation	N/A	N/A	N/A	N/A	• The underbridge is wide enough to have no significant impact on flow or sediment dynamics	N/A	N/A	N/A	N/A	• Size of the tributary means that no significant effects would be anticipated	
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	• The people mover crossing design is effectively an open span bridge so would not affect depth and width variation	N/A	N/A	N/A	N/A	• The underbridge is wide enough to have no significant impact on riparian zones	N/A	N/A	N/A	N/A	• Size of the tributary means that no significant effects would be anticipated	

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen																
NONE	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements (black text = proposed within groundwater body, yellow text = elsewhere)	River Diversion (including culverts)					Diddington Cutting		Impacts from other WFD water bodies (assessed separately) - Multiple Scheme elements - River Blythe GB GB104028042571 (including River Blythe bypass culvert and Horn Brook diversion)	Impacts from other WFD water bodies (assessed separately) - Multiple Scheme elements - River Cole (overbridge and viaducts)
	GB104028042572	Moderate	Good ecological status by 2027	Description of scheme element impact	Very minor unnamed tributary of River Blythe (a ditch running from M42 to Fish Pool Lane) - 600 m, including 4 culverts (175 m)					Cutting will lead to decreased dry weather flows to Hollywell Brook, as drainage from cutting, which currently discharges to a pond on Hollywell Brook, will discharge via an attenuation pond to Shadow Brook. There will be no effect on flows to the River Blythe, only to the two tributaries.			
	River Blythe from Patrick Bridge to River Tame			Identified biological impacts	Noise and vibration	Shading	Landtake	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Creation of new habitats	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.		
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	Moderate	Good		Receptor not sensitive to impact. No likely effect anticipated.	Potential modification of macrophytes communities, due to reduction in photosynthetic activity. No macrophyte data available locally on the watercourse (agricultural ditch). By default, localised adverse effect expected, with no deterioration of the status of the element	Temporary loss of 600 m while the new channel re-establishes. In addition, the 4 culverts on the new channel will lead to the permanent loss of 175 m of habitat. The ponded ditch is heavily shaded and currently supports very low aquatic vegetation in the stretch impacted (baseline surveys). Effect likely to be locally adverse, with no deterioration of the status of the element at the scale of the water body.	Potential increase in flow velocities, reduction of habitat continuity and streambed alterations, with no effect at the scale of the water body. The tributary is heavily shaded and currently supports very low aquatic vegetation in the stretch impacted. Effect likely to be negligible, with no deterioration of the status of the element at the scale of the water body.	The new channels will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species, excepted within the culverted areas. The ponded ditch is heavily shaded and currently supports very low aquatic vegetation in the stretch impacted (baseline surveys). Overall neutral effect anticipated, despite the creation of new habitat in reason of the presence of 175 m of culverts, with no degradation of the element status at the scale of the water body.	Potential to affect base flows on Hollywell Brook, especially during low flows. The watercourse currently supports dense and moderately diverse aquatic vegetation in the stretch impacted (baseline surveys). Effect is considered as being adverse locally, with no likely impact at the scale of the water body.	Potential adverse effects on water quality of Hollywell Brook and Shadow Brook, tributaries of the River Blythe. Hollywell Brook currently supports dense and moderately diverse aquatic vegetation in the stretch impacted while Shadow Brook does not support any aquatic vegetation (baseline surveys). Effect is considered as being adverse locally on Hollywell Brook, with no likely impact at the scale of the water body.	Given the distance between the scheme elements on the River Blythe GB104028042571 and the River Blythe GB104028042572 and that cumulative hydromorphological impacts may locally affect flows, but are considered to be negligible at the scale of the water body, no likely effect is anticipated.	Given the distance between the scheme elements on the River Cole and the River Blythe and the fact that hydromorphological changes are considered to be insignificant, no likely effect is anticipated on the status of this element at the scale of the water body.
	3. Macroinvertebrates	High	High		Receptor not sensitive to impact. No likely effect anticipated.	No additional effect anticipated (loss of vegetation already considered in the landtake impact).	Temporary loss of 600 m of macroinvertebrate habitat while the new channel re-establishes. In addition, the 4 culverts on the new channel will lead to the permanent loss of 175 m of habitat available to macroinvertebrates. The ponded ditch currently supports moderately good macroinvertebrate quality (baseline surveys). Localised adverse effect expected, with no deterioration of the status of the element at the scale of the water body.	Potential increase in flow velocities, reduction of habitat continuity, disconnection between the channel and the riparian vegetation and streambed alterations, with no effect at the scale of the water body. The ponded ditch currently supports moderately good macroinvertebrate quality (baseline surveys). Hydromorphological changes are likely to lead to alterations of the communities present and have a localised adverse effect on macroinvertebrates. No change in the status of the element at the scale of the water body.	The river diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach, excepted within the culverted area. The ponded ditch currently supports moderately good macroinvertebrate quality (baseline surveys). Overall neutral effect anticipated, despite the creation of new habitat in reason of the presence of 175 m of culverts, with no degradation of the element status at the scale of the water body.	Potential to affect base flows on Hollywell Brook, especially during low flows. As Hollywell Brook supports good macroinvertebrate quality in the stretch impacted , with communities adapted to low flows (baseline survey). Effect is considered as being adverse locally, with no likely impact at the scale of the water body.	Potential adverse effects on water quality of Hollywell Brook and Shadow Brook, tributaries of the River Blythe. Hollywell Brook currently supports good macroinvertebrate quality in the stretch impacted, including highly pollution sensitive taxa (baseline surveys). Shadow Brook supports moderate to good macroinvertebrate quality, including highly pollution sensitive taxa (baseline surveys). Effect is considered as being adverse, with no likely impact at the scale of the water body.	Given the distance between the scheme elements on the River Blythe GB104028042571 and the River Blythe GB104028042572 and that cumulative hydromorphological changes are considered to be insignificant, no likely effect is anticipated on the status of this element at the scale of the water body.	Given the distance between the scheme elements on the River Cole and the River Blythe and the fact that hydromorphological changes are considered to be insignificant, no likely effect is anticipated on the status of this element at the scale of the water body.
	4. Fish	High	High		Localised and temporary adverse effect during construction. No deterioration of the water body status of the element is however expected.	No additional effect anticipated (loss of vegetation already considered in the landtake impact).	Temporary loss of 600 m of fish habitat while the new channel re-establishes. In addition, the culverts on the new channel will lead to permanent loss of habitat available, and constitute a barrier to fish movements. No data available for fish on the ponded ditch. However, the River Blythe supports brown trout population (baseline surveys). A localised adverse effect is expected on the tributary. However, as the watercourse is already culverted within the area, the culvert will not have the potential to deteriorate the current element status at the scale of the water body.	Potential increase in flow velocities, reduction of habitat continuity, disconnection between the channel and the riparian vegetation and streambed alterations, with no effect at the scale of the water body. No data available for fish on the ponded ditch. Hydromorphological changes are likely to lead to alterations of the communities present and have a localised adverse effect on macroinvertebrates. No change in the status of the element at the scale of the water body.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities. No data available for fish on the ponded ditch. However, the River Blythe supports brown trout population (baseline surveys). Overall neutral effect anticipated, despite the creation of new habitat in reason of the presence of 175 m of culverts, with no degradation of the element status at the scale of the water body.	Potential to affect base flows on Hollywell Brook, especially during low flows. As Hollywell Brook currently supports diverse and relatively dense fish populations and as the River Blythe is a designated fisheries, supporting brown trout population (baseline surveys), effect is considered as having the potential to be adverse at the scale of the water body.	Potential adverse effects on water quality of Hollywell Brook and Shadow Brook, tributaries of the River Blythe. Hollywell Brook currently supports diverse and relatively dense fish populations, while Shadow Brook is not a feature of importance for fish. Adverse effect anticipated on Hollywell Brook with the potential for to be adverse at the scale of the water body.	The culvert present on the River Blythe bypass is likely to reduce connectivity to the River Blythe main channel. In addition, cumulative hydromorphological impacts (notably from the River Blythe bypass culvert and Horn Brook culvert and diversion) may locally affect flows, essentially within the River Blythe bypass, common to the two designated water bodies. River Blythe main channel currently supports moderately diverse and abundant fish communities, including brown trout. Given the potential value of the River Blythe bypass for fish (i.e. shelter, spawning), a potential minor adverse effect on fish is possible. Potential to lead to a deterioration of the status of the fish element at the scale of the water body.	Given the distance between the scheme elements on the River Cole and the River Blythe, the fact that hydromorphological changes are considered to be insignificant, and that no culvert is located within the vicinity of the River Blythe, no likely effect is anticipated on the status of this element at the scale of the water body.
	Physico-Chemical status												
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)			N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor locally, with no degradation of the element status anticipated at the scale of the water body.	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.
	6. pH	High	-				N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact		
	7. Phosphate	Moderate	-				N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches of the Hollywell Brook due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution. Two discharge consents for STW final effluent on Hollywell Brook. Overall water body (River Blythe) not affected as dewatering discharge is upstream of reach parallel to cutting.		
	8. Ammonia	High	-				N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects		
	9. Temperature		-				Some shading from the culverts may have a minor impact on water temperature, but this is likely to be a small, localised effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact		
	10. Specific Pollutants (Annex VIII)	High	-				N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect	Receptor is insensitive to impact	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects		
	Hydromorphological status												
WFD classification elements	11. Quantity and dynamics of river flow	-	-		N/A	N/A	N/A	• Channel widths appear to be 0.5m to 1m or less, so there is unlikely to be significant diversity of flow dynamics in any of the channels • However the 175m culvert affects a high proportion of this stream and would result in a severe loss of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to the vegetation lined channel, which may result in increased flow velocities due to increased channel gradients and decreased roughness. • In practical terms the impacts on hydromorphology are considered to be minimal at water body scale, since these watercourses are very small in scale relative to the whole water body	N/A	• Reduction of flows in this tributary could cause a localised reduction in flow volumes, depths and dynamics, and consequent reductions in sediment transport (and increased sediment deposition) and reduced out-of-channel habitat connectivity. The effect could be significant for this tributary, but would be buffered as soon as the tributary connects to the larger downstream watercourse so there would not be severe effects at water body scale	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects/A	• Cumulative impacts on GB104028042571 the River Blythe Bypass at its downstream end due to the River Blythe Bypass Culvert and Horn Brook culvert and diversion, and existing A452 and Cornets End Lane culverts and Cornets End lane gravel works may cascade to GB104028042572. This may have an insignificant effect due to the relative size of these components of GB104028042571 and the scale of their contribution to GB104028042572, but there is still a risk to local flow dynamics around the confluence	• The River Cole joins the River Blythe approximately 400m upstream of the River Tame, so in principle any impacts on the River Cole could cascade to the adjoining water body • The River Cole crossing designs near the River Blythe and the M42/M6 Toll are effectively open span bridges so would not affect the River Cole or the River Blythe • Footings in riparian zones or floodplains could cause some local turbulence at flood flows, but would not considered to be significant
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	• Flows could be reduced - see commentary on the cutting	N/A			• Likely to be no significant relationship between hydromorphology and groundwater	• Likely to be no significant relationship between hydromorphology and groundwater
	13. River continuity	-	-		N/A	N/A	N/A	• The culvert would affect a large proportion of this stream, would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever any existing habitat continuity, but this is a minor feature and in practical terms would not impact on deterioration of overall water body status	N/A			• The cumulative effects on GB104028042571 and the scale of their contribution to GB GB104028042572 probably mean there would be no significant impacts on continuity	• Crossing designs mean there will be no footings in the watercourse • Footings in riparian zones or floodplains would not interrupt continuity
	14. River depth and width variation bed	-	-		N/A	N/A	N/A	• Out-of bank flows may be constrained by the culvert, but the channel water surface at the crossing location is not wide enough to be visible or measurable from aerial imagery, so there is unlikely to be significant diversity of river depth and width, and the culvert is unlikely to cause significant impacts. The culvert would not require significant channel realignment or straightening. • Given the extent of the culvert and the loss of open watercourse, the impacts on channel width and depth are likely to be detrimental	N/A			• The cumulative effects on GB104028042571 and the scale of their contribution to GB104028042572 probably mean there would be no significant impacts on channel geometry	• Crossing designs mean there will be no footings in the watercourse • Comparison of historic maps suggests that channel planform is stable in the order of decades, so no impacts are anticipated
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• Channel water surface at the crossing location is not wide enough to be visible or measurable from aerial imagery, so there is unlikely to be significant bed substrate transport or scour. • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk • Given the extent of the culvert and the loss of open watercourse, the impacts on channel bed substrates are likely to be detrimental, especially as access for maintenance will presumably not be possible	N/A			• The cumulative effects on GB104028042571 and the scale of their contribution to GB104028042572 probably mean there would be no significant impacts on bed substrates	• Crossing designs are effectively open span bridges, so there would be no impacts on the channel bed
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	• The culvert would disconnect the channel from the existing well developed, mature vegetation riparian zone and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms would not impact on deterioration of water body status	N/A			• Cumulative impacts on flow processes would be highly unlikely to affect riparian qualities in GB104028042572	• Footings in the riparian zones would require minor land take but not considered to be significant

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen									
NONE	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements (black text = proposed within groundwater body, yellow text = not proposed)	OVERALL impact on element	Proposed Mitigation Measures: Construction	Proposed Mitigation Measures: Operation	Residual effect	
	GB104028042572	Moderate	Good ecological status by 2027	Description of scheme element impact					
	River Blythe from Patrick Bridge to River Tame			Identified biological impacts					
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	
	2. Macrophytes and phytobenthos - macrophytes	Moderate	Good		Three scheme elements are identified as having adverse effects on macrophytes, the River Blythe viaduct, the culvert on the Hollywell Brook, the culvert on the Shadow Brook and two river diversions on tributaries, one of the Hollywell Brook and one of the Blythe. Removal of an existing culvert on the Hollywell Brook help to offset impacts of permanent. However, these adverse effects are likely to be only very localised around the scheme element (i.e. culverts, viaducts) and/or temporary with a few potential beneficial effects in the longer term (i.e. river diversions, culvert removal), notably via habitat creations. In addition, most of the scheme elements are impacting relatively small watercourses at the scale of the water body while the River Blythe main channel main watercourse within this water body is crossed by one 15 m wide clear span viaduct. Therefore, cumulative impacts are not considered to have the potential to lead to the deterioration of the status of the macrophytes WFD element at the water body scale. Overall, the scheme, as currently designed, is unlikely to lead to the degradation of the macrophytes WFD status of the water body (currently moderate), even in the short term. In addition, the scheme is not believe to have the potential to compromise the achievement of the WFD macrophytes Good status objective in the longer term, and is unlikely to participate to the achievement of this Good status.	None required.	Culverts will be regularly maintained and kept in a functional state that allows fish movements. -Construction and post-construction monitoring should be considered (if necessary) to assess any effects on fish migration. - Improvements to habitat within the proximity of culverts should be included in the detailed design designing and the culvert should be positioned so that bed substrate can deposit and/or artificial substrate included. - Further improvements to Hollywell Brook, including renaturalising the course (meanders), inclusion of improved marginal and channel habitats (riffles, berms etc.). An area of the upstream section is described as being currently 'overdeepened' (river corridor baseline surveys) and would benefit from such improvements. This section of the watercourse currently falls into the construction boundary for the scheme and therefore further 'offsite' work would not be required. - The Environment Agency should be consulted during the detailed design of watercourse modifications (for diverted sections of Hollywell Brook in particular) to ensure habitat improvements are maximised.	Minor and localised effects	
	3. Macroinvertebrates	High	High		Six scheme elements are identified as having the potential to have adverse effects on macroinvertebrates. However, these adverse effects are likely to be only very localised around the scheme element (i.e. culverts, viaducts) and/or temporary with also a few potential beneficial effects in the longer term (i.e. river diversions, culvert removal). In addition, most of the scheme elements are impacting relatively small tributaries at the scale of the water body, while the River Blythe, main watercourse within this water body, is crossed by one 15 m-wide clear span viaduct. Therefore, and as cumulative impacts are not considered as having a significant effect on hydromorphology, they are not considered to have the potential to deteriorate the macroinvertebrate current status of the water body. Overall, the scheme, as currently designed, is unlikely to lead to the degradation of the macroinvertebrate WFD status of the water Body (currently High), even in the short term. In addition, the scheme is not believe to be able to compromise the achievement of the WFD macroinvertebrate status objectives in the longer term (which are for the status to remain High).	None required.		Minor and localised effects	
	4. Fish	High	High		Nine scheme element are described as having the potential to have an adverse effect on fish. While most of these effects are likely to be short term and/or localised around the scheme elements, the cumulative impacts of scheme elements present on the River Blythe GB GB104028042571 water body (notably culverts on the River Blythe bypass and on Horn Brook), the effects of dewatering, and culverts present on minor tributaries are identified as having the potential to lead to a deterioration of the current fish status at the scale of the water body. This is because they may constitute an obstruction to fish migration within the water body (which currently supports a population of brown trout) and may limit access to features of interest to fish (shelter and spawning). Therefore, based on the limited design data available the scheme, the deterioration of the fish status of the River Blythe water body cannot be ruled out. In addition, it is also possible that these scheme elements would compromise the WFD objectives for this element (which are for the status to remain High).	- Surveys of the Hollywell Brook, Shadow Brook and tributaries of the R Blythe and the Hollywell Brook will be undertaken during the detailed design stage in order to establish the baseline fish population. An assessment of the culverts with relation to flows and fish passage must be included as part of the detailed design development. Culvert lengths will be minimised as far as possible, and the design of the culvert boundaries (i.e. where they connect with the existing bed and banks) will be developed in detail. - Fish rescue will be carried out on any sections that will be dewatered (e.g. Hollywell Brook during construction of diverted section).	Minor and localised effects	Based on current information the effect remains amber (i.e. there is a risk that the scheme could result in the deterioration of this element). However, the impact may be reduced to a 'yellow' if the additional mitigation measures (notably the improvements to Hollywell Brook) are maximised and in light of pre construction surveys.
	Physico-Chemical status								
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	Potential minor and localised effects on element.	None required.	None required.	Minor and localised effects	
	6. pH	High	-		Receptor is insensitive to impact			No significant effects	
	7. Phosphate	Moderate	-		Depending on how much flow is lost, potential minor and localised effects on element in Hollywell Brook. Two discharge consents for STW final effluent on Hollywell Brook.			Minor and localised effects	
	8. Ammonia	High	-		Potential minor and localised effects on element.			Minor and localised effects	
	9. Temperature		-		Receptor is insensitive to impact			No significant effects	
	10. Specific Pollutants (Annex VIII)	High	-		Potential minor and localised effects on element.			Minor and localised effects	
	Hydromorphological status								**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	• Culverts and diversions of tributaries mean that there is potential have adverse effects on flow and sediment dynamics at local scale • Viaducts and underbridges are unlikely to have any significant impacts • Dewatering associated with cuttings could negatively affect hydrological and sediment transport regimes • However, likely these adverse effects are likely to be only very localised around the scheme element (i.e. culverts, viaducts) and/or temporary with a few potential beneficial effects in the longer term (i.e. river diversions, culvert removal). Overall, hydromorphological risks are minor	• No additional mitigation is required for viaducts or underbridges • Hydromorphological surveys to be undertaken to aid detailed design development • Hydromorphological mitigation should be included into detailed design where practicable, for example with respect to bank reprofiling (rehabilitation), bed morphology and use of soft engineering techniques • The reinstated riparian zones at the site of the culvert removal should be planted with the same species that exist in the adjacent areas to encourage natural recovery	Minor and localised effects	• Hydromorphology baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-						
	13. River continuity	-	-						
	14. River depth and width variation bed	-	-						
	15. Structure and substrate of river bed	-	-						
	16. Structure of riparian zone	-	-						

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen					
NONE	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	No effect from scheme on measures to address reasons for failure.	-	-	No significant effect

A. Risk screening of potential to cause deterioration of current WFD status

	Surface Water body	Current status	Status objective	Scheme Elements	River Cole Viaduct No.1, River Cole viaduct No. 2, Coleshill viaduct No. 3 and river diversion						River Cole Overbridge				
	GB104028042420	Moderate	Good Ecological Potential by 2027	Description of scheme element impact	Diversion of the existing River Cole for a distance of 600m. Creation of a river diversion of 950m. 3 viaducts crossing the realigned watercourse. Footings for all three viaducts outside the diverted watercourse.						Overbridge over diverted R Cole. Works will be phased to avoid construction impacts in existing R Cole prior to diversion.				
	River Cole from Hatchford-Kingshurst Brook to River Blythe			Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Creation of new habitats	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	No data	No data		Receptor is insensitive to impact	Macrophytes will be lost from a 600m section of the existing watercourse due to the river diversion. The river is heavily re-sectioned but supports an assemblage of channel and marginal macrophyte species characteristic of a lowland river.	There may be minor changes in the cover and composition of macrophyte communities beneath the viaducts, but cumulatively this is not considered to be greater than a minor localised change.	Changes to hydromorphology likely to be beneficial or neutral for macrophytes.	No impact. Runoff will be collected by drainage to balancing pond.	The realigned channel will be longer than the existing channel and include a number of meanders. It will include an appropriate range of in-channel and riparian habitat features which represents an improvements to the existing, heavily re-sectioned channel .	Receptor is insensitive to impact	No impact. Loss of macrophytes from existing R Cole channel assessed as part of river diversion	There may be minor changes in the cover and composition of macrophyte communities beneath the viaducts, but cumulatively this is not considered to be greater than a minor localised change.	No impact. Impacts on hydromorphology of existing channel assessed as part of river diversion.	No impact. Runoff will be collected by drainage to balancing pond.
	3. Macroinvertebrates	Moderate	Not required		Receptor is insensitive to impact	Macroinvertebrate habitat will be lost from a 600m section of the existing watercourse due to the river diversion.	Macroinvertebrate community beneath viaducts may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor, and offset by the increased channel length (350m) afforded by the river diversion.	Changes to hydromorphology likely to be beneficial or neutral for macroinvertebrates.	No impact . Runoff will be collected by drainage to balancing pond.	The realigned channel will be longer than the existing channel and include a number of meanders. It will include an appropriate range of in-channel and riparian habitat features which represents an improvements to the existing, heavily re-sectioned channel .	Receptor is insensitive to impact	No impact. Loss of macrophytes from existing R Cole channel assessed as part of river diversion	Macroinvertebrate community beneath viaducts may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor, and offset by the increased channel length (350m) afforded by the river diversion.	No impact. Impacts on hydromorphology of existing channel assessed as part of river diversion.	No impact. Runoff will be collected by drainage to balancing pond.
	4. Fish	Moderate	Not required		No impacts anticipated during construction as footings will be constructed outside existing channel. There may be minor vibration impacts during operation due to trains passing over the viaduct but this is not considered to cause disturbance to fish.	Fish spawning, migratory and foraging habitats will be lost from a 950m section of the existing watercourse due to the river diversion. Temporary effects on fish populations are likely to occur including increased competition for resources as channel habitats establish in diverted channel.	Fish foraging habitat beneath the viaducts may be reduced but this is offset by increased channel length afforded by the river diversion.	Changes to hydromorphology likely to be beneficial or neutral for fish.	Absence. Runoff will be collected by drainage to balancing pond.	The realigned channel will be longer than the existing channel and include a number of meanders. It will include an appropriate range of in-channel and riparian habitat features which represents an improvements to the existing, heavily re-sectioned channel .	No impact. The overbridge is remote from the existing R Cole and will be constructed before the existing channel is diverted, therefore noise and vibration impacts anticipated during construction. No footings in diverted watercourse, therefore no effects anticipated during operation.	No impact. Loss of macrophytes from existing R Cole channel assessed as part of river diversion	Fish foraging habitat beneath the viaducts may be reduced but this is offset by increased channel length afforded by the river diversion.	No impact. Impacts on hydromorphology of existing channel assessed as part of river diversion.	No impact. Runoff will be collected by drainage to balancing pond.
	Physico-Chemical status														
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary in relation to the water body. • The new channel can provide, when re-established, similar/marginally improved dissolved oxygen levels as a result of the increased river length, allowing for improved habitat and subsequent increase in photosynthetic organisms. Overall effect likely to be minor beneficial, with opportunity to maintain the above good physico-chemical status of the water body.	N/A	N/A	There is likely to be a minor impact on dissolved oxygen as a result of shading. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
	6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	7. Phosphate	Good	-		N/A	N/A	N/A	effectively an open span bridge, so there would be no im	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact
	8. Ammonia	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	9. Temperature	-	-		N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	There is likely to be a minor impact on temperature as a result of shading. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
	Hydromorphological status														
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	• Channel realignment is assumed to mean that there will be no footings in the watercourse • Footings in riparian zones could cause some local turbulence at peak flows, but not considered to be significant	N/A	• Proposed realignment would remeander straightened reach and help to restore natural flow dynamics • Flow velocities, bed scour and channel depth are typically increased in straightened reaches, so the realignment would reduce gradients to be more consistent with the reaches upstream and may promote increased riparian and floodplain connectivity and out of channel flows	N/A	• Proposed realignment would create several hundred metres of new open watercourse habitat	N/A	• Channel realignment is assumed to mean that there will be no footings in the watercourse • Footings in riparian zones and embankments in the floodplain could constrain out of channel flows and cause some local turbulence at the footings at peak flows, but not considered to be significant	N/A	• Channel realignment is assumed to mean that there will be no footings in the watercourse • Bridge footings close to the channel banks and embankments in the floodplain could cut-off floodplain flows constrain flood flows through the bridge, causing increase turbulence and flow velocities. Negative impacts would be greater than for the viaducts, but are still considered unlikely to be detrimental to WFD objectives	N/A
	12. Connection to Groundwater	-	-		N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A		N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A
	13. River continuity	-	-		N/A	• New crossing is close to existing M42 culvert, so although the viaduct will not extend the culvert, local hydromorphology could be sensitive and local impacts could be exacerbated	N/A	• Reducing bed gradients may serve to increase lateral connectivity with the riparian zones and floodplain	N/A	• A wetlands habitat would improve local habitats, but they would remain fragmented	N/A	• New crossing is close to existing M42 culvert, so although the viaduct will not extend the culvert, local hydromorphology could be sensitive and local impacts could be exacerbated	N/A	• Riparian zones and floodplain continuity would be obstructed by the bridge footings and embankments close to the channel, although the effects are unlikely to be severe	N/A
	14. River depth and width variation bed	-	-		N/A	• Potential risk of channel narrowing if diverted channel erodes laterally against viaduct footings	N/A	• Straightening tends to result in scour, so remeandering the channel could help to re-establish gravel bed habitats • However, invertebrate surveys suggest that the bed habitats are dominated by silts. It is not known whether this is the natural channel condition or whether there are excess silts associated with urbanisation and agriculture. • At the current level of knowledge, it is not possible to judge bed conditions accurately, so on balance the impact cannot highlighted as positive or negative	N/A	• Straightening tends to result in scour, so remeandering the channel could help to re-establish gravel bed habitats • However, reduced flow velocities could result in increased sedimentation. • At the current level of knowledge, it is not possible to judge bed conditions accurately, so on balance the impact cannot highlighted as positive or negative	N/A	• The footing and raised embankments would narrow the river corridor, but are unlikely to significantly affect the channel	N/A	• Potential risk of channel narrowing if diverted channel erodes laterally against bridge footings • A scour pool may develop if peak flows are severely constrained through the bridge • On balance, changes to channel width and depth are likely to be small and although they could present some concerns for structural integrity, they would also promote some diversity of habitat. • If scour is thought to be a significant risk, bank reinforcements may be required, which would locally modify the channel	N/A
	15. Structure and substrate of river bed	-	-		N/A	• No impact anticipated	N/A	• Straightening tends to result in scour, so remeandering the channel could help to re-establish gravel bed habitats	N/A	• Straightening tends to result in scour, so remeandering the channel could help to re-establish gravel bed habitats	N/A	• Land take would not affect bed properties	N/A	• Some bed scour could occur, but it is highly unlikely to be detrimental to WFD	N/A
	16. Structure of riparian zone	-	-		N/A	• Footings in the riparian zones would cause some localised turbulence at peak flows, but relative to the area of open space across the floodplain this is likely to be insignificant	N/A	• No net change to existing bank, riparian and floodplain structure and connectivity with channel	N/A	• No net change to existing bank, riparian and floodplain structure and connectivity with channel	N/A	• Footings could obstruct the riparian zones	N/A	• Footings in the riparian zones would cause some localised turbulence at peak flows, but relative to the area of open space across the floodplain this is likely to be insignificant	N/A

B. Risk screening of potential to prevent future attainment of good WFD status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	Identified chemical impacts											
Educate landowners on sensitive management practices (urbanisation)	-	In place	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-	-	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	-	In place		-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	-	-		-
Increase in-channel morphological diversity	-	In place		-	-	-		-		-	-	-	-		-
Preserve and where possible restore historic aquatic habitats	-	In place		-	-	-		-		-	-	-	-		-
Operational and structural changes to locks, sluices, weirs, beach control, etc.	-	Not in place		-	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-	-	-	-		-

A. Risk screening of potential to cause deterioration of current WFD status

	Surface Water body	Current status	Status objective	Scheme Elements	Drain to R Cole at M42-M6 Link Viaduct No. 1 and No. 2						Tributary to R Cole and Green Lane - M6 viaduct 1 and 2					Coleshill Brook at Coleshill - Coleshill embankment and viaduct				
	GB104028042420	Moderate	Good Ecological Potential by 2027	Description of scheme element impact	Drain will be crossed by viaduct and may require realignment						Drain will be crossed by viaduct and may require realignment									
	River Cole from Hatchford-Kingshurst Brook to River Blythe			Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Habitat creation	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	No data	No data		Receptor is insensitive to impact	No data available. There will be temporary, localised loss of macrophytes until the diverted channel re-establishes	Shading beneath viaduct may result in loss or change to macrophyte communities for short section.	Diversion may result in minor changes to hydromorphology, though it would be designed to replicate existing conditions.	No impact. Runoff will be collected by drainage to balancing pond.	The diversion will include an appropriate range of in-channel and riparian habitat features.	Receptor is insensitive to impact	No data available. There will be temporary, localised loss of macrophytes until the diverted channel re-establishes	Shading beneath viaduct may result in loss or change to macrophyte communities for short section.	Realignment may result in minor changes to hydromorphology, though it would be designed to replicate existing conditions.	No impact. Runoff will be collected by drainage to balancing pond.	Receptor is insensitive to impact	No data available. There will be temporary, localised loss of macrophytes until the diverted channel re-establishes	Shading beneath viaduct may result in loss or change to macrophyte communities for short section.	Realignment may result in minor changes to hydromorphology, though it would be designed to replicate existing conditions.	No impact. Runoff will be collected by drainage to balancing pond.
	3. Macroinvertebrates	Moderate	Not required		Receptor is insensitive to impact	No data available. There will be temporary, localised loss of macroinvertebrate habitat until the diverted channel re-establishes	Change or loss of macrophyte communities may result in minor changes to macroinvertebrate community within the affected reach.	No data available, therefore sensitivity of community not known. Minor changes may occur	No impact . Runoff will be collected by drainage to balancing pond.	The diversion will include an appropriate range of in-channel and riparian habitat features.	Receptor is insensitive to impact	No data available. There will be temporary, localised loss of macroinvertebrate habitat until the diverted channel re-establishes	Change or loss of macrophyte communities may result in minor changes to macroinvertebrate community within the affected reach.	No data available, therefore sensitivity of community not known. Minor changes may occur	No impact . Runoff will be collected by drainage to balancing pond.	Receptor is insensitive to impact	No data available. There will be temporary, localised loss of macroinvertebrate habitat until the diverted channel re-establishes	Change or loss of macrophyte communities may result in minor changes to macroinvertebrate community within the affected reach.	No data available, therefore sensitivity of community not known. Minor changes may occur	No impact . Runoff will be collected by drainage to balancing pond.
	4. Fish	Moderate	Not required		No fish data available for tributary. Watercourse will be spanned by viaduct and therefore no impacts anticipated.	No data available. There will be temporary, localised loss of macrophyte, macroinvertebrate and therefore fish habitat until the diverted channel re-establishes	Any localised changes to macroinvertebrate and macrophyte community considered unlikely to cause changes in fish community as alternative habitat available.	No data available, therefore sensitivity of community not known. Minor changes may occur	Absence. Runoff will be collected by drainage to balancing pond.	The diversion will include an appropriate range of in-channel and riparian habitat features .	No fish data available for tributary. Watercourse will be spanned by viaduct and therefore no impacts anticipated.	No data available. There will be temporary, localised loss of macrophyte, macroinvertebrate and therefore fish habitat until the diverted channel re-establishes	Any localised changes to macroinvertebrate and macrophyte community considered unlikely to cause changes in fish community as alternative habitat available.	No data available, therefore sensitivity of community not known. Minor changes may occur	Absence. Runoff will be collected by drainage to balancing pond.	No fish data available for tributary. Watercourse will be spanned by viaduct and therefore no impacts anticipated.	No data available. There will be temporary, localised loss of macrophyte, macroinvertebrate and therefore fish habitat until the diverted channel re-establishes	Any localised changes to macroinvertebrate and macrophyte community considered unlikely to cause changes in fish community as alternative habitat available.	No data available, therefore sensitivity of community not known. Minor changes may occur	Absence. Runoff will be collected by drainage to balancing pond.
	Physico-Chemical status																			
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary and any effect is considered negligible in relation to the overall size of the water body. No change in current status is anticipated.	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
	6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact
	7. Phosphate	Good	-		N/A	N/A	N/A	tively an open span bridge, so there would be	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	N/A	ectively an open span bridge, so there would be no	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	N/A	tively an open span bridge, so there would be	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
	8. Ammonia	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact
	9. Temperature	-	-		N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
	Hydromorphological status																			
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted Change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics • Drain to R Cole is a minor tributary , and in practical terms represents a small proportion of the water body • Lengthening the channel may reduce flow rates although the diversion is not far from the existing channel course • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of lengthening the watercourse still needs to be flagged as a risk.	N/A	N/A	N/A	N/A	N/A	• Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics • Tributary to River Cole is a minor tributary , and in practical terms represents a small proportion of the water body • Lengthening the channel may reduce flow rates although the diversion is not far from the existing channel course • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of lengthening the watercourse still needs to be flagged as a risk	N/A	N/A	N/A	N/A	• Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics • Coleshill Brook is a minor tributary , and in practical terms represents a small proportion of the water body • Lengthening the channel may reduce flow rates although the diversion is not far from the existing channel course • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of lengthening the watercourse still needs to be flagged as a risk.	N/A
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A
	13. River continuity	-	-		N/A	N/A	N/A	• Lengthening the channel may result in increased channel storage and reduced floodplain connectivity, but the size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected	N/A	N/A	N/A	N/A	N/A	• Lengthening the channel may result in increased channel storage and reduced floodplain connectivity, but the size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected	N/A	N/A	N/A	N/A	N/A	• Lengthening the channel may result in increased channel storage and reduced floodplain connectivity, but the size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected	N/A
	14. River depth and width variation bed	-	-		N/A	N/A	N/A	• The diversion would replicate existing channel geometry. Out of channel flow depths may decrease as a result of lengthening the channel, but in practical terms there would be no significant change	N/A	N/A	N/A	N/A	N/A	• The diversion would replicate existing channel geometry. Out of channel flow depths may decrease as a result of lengthening the channel, but in practical terms there would be no significant change	N/A	N/A	N/A	N/A	N/A	• The diversion would replicate existing channel geometry. Out of channel flow depths may decrease as a result of lengthening the channel, but in practical terms there would be no significant change	N/A
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• Lengthening a channel tends to reduce flow rates and increase deposition of sediment • Given the size of the watercourse there would probably be no measurable impact	N/A	N/A	N/A	N/A	N/A	• Lengthening a channel tends to reduce flow rates and increase deposition of sediment • Given the size of the watercourse there would probably be no measurable impact	N/A	N/A	N/A	N/A	N/A	• Lengthening a channel tends to reduce flow rates and increase deposition of sediment • Given the size of the watercourse there would probably be no measurable impact	N/A
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	• Although channel capacity would increase, there is likely to be no net change to existing bank, riparian and floodplain structure and connectivity with channel	N/A	N/A	N/A	N/A	N/A	• Although channel capacity would increase, there is likely to be no net change to existing bank, riparian and floodplain structure and connectivity with channel	N/A	N/A	N/A	N/A	N/A	• Although channel capacity would increase, there is likely to be no net change to existing bank, riparian and floodplain structure and connectivity with channel	N/A

B. Risk screening of potential to prevent future attainment of good WFD status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	Identified chemical impacts																	
Educate landowners on sensitive management practices (urbanisation)	-	In place	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-	-	-	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-	-	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	-	In place		-	-	-		-	-	-	-	-		-	-	-	-		-
Increase in-channel morphological diversity	-	In place		-	-	-		-	-	-	-	-		-	-	-	-		-
Preserve and where possible restore historic aquatic habitats	-	In place		-	-	-		-	-	-	-	-		-	-	-	-		-
Operational and structural changes to locks, sluices, weirs, beach control, etc.	-	Not in place		-	-	-		-	-	-	-	-		-	-	-	-		-

A. Risk screening of potential to cause deterioration of current WFD status

	Surface Water body	Current status	Status objective	Scheme Elements	Impacts from other WFD water bodies (assessed separately)	Overall impact on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
							Construction	Operation		
	GB104028042420	Moderate	Good Ecological Potential by 2027	Description of scheme element impact						
	River Cole from Hatchford-Kingshurst Brook to River Blythe			Identified biological impacts						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possible, red = likely)						-
	2. Macrophytes and phytobenthos - macrophytes	No data	No data		Not required. Upstream water body not impacted by Scheme.	Loss of 600m of the existing River Cole will result in the loss of existing macrophyte communities and therefore a potential deterioration during construction only. However, the new diversion will be longer (950m) and offers opportunities for habitat enhancement and therefore localised improvements. All other impacts are minor and localised and are not considered to result in a deterioration in potential for this quality element. On balance, although there are some improvements there are also some minor, localised and potentially adverse effects (from culverting, as well as temporary construction effects) and the overall effect is considered as being neutral.	Removal/rescue of fish during dewatering of Cole (for the diversion). - No further mitigation measures than those included within the current design appear necessary.	- The Environment Agency should be consulted during the detailed design of watercourse modifications (for diverted sections of the River Cole A^B in particular) to ensure habitat improvements are maximised.	Based on current information the effect remains green. However, the impact may be improved to 'pale blue' (minor/localised improvement) if the additional mitigation measures (notably the improvements to the River Cole) are maximised.	
	3. Macroinvertebrates	Moderate	Not required		Not required. Upstream water body not impacted by Scheme.	Loss of 600m of the existing River Cole will result in the loss of existing macroinvertebrate communities and therefore a potential deterioration during construction only. However, the new diversion will be longer (950m) and offers opportunities for habitat enhancement and therefore localised improvements. All other impacts are minor and localised and are not considered to result in a deterioration in potential for this quality element. On balance, although there are some improvements there are also some minor, localised and potentially adverse effects (from culverting, as well as temporary construction effects) and the overall effect is considered as being neutral.			Based on current information the effect remains green. However, the impact may be improved to 'pale blue' (minor/localised improvement) if the additional mitigation measures (notably the improvements to the River Cole) are maximised.	
	4. Fish	Moderate	Not required		Not required. Upstream water body not impacted by Scheme.	Loss of 600m of the existing River Cole will result in the disruption of existing fish communities and therefore a potential deterioration during construction only. However, the new diversion will be longer (950m) and offers opportunities for habitat enhancement and therefore localised improvements. All other impacts are minor and localised and are not considered to result in a deterioration in potential for this quality element. On balance, although there are some improvements there are also some minor, localised and potentially adverse effects (from culverting, as well as temporary construction effects) and the overall effect is considered as being neutral.			Based on current information the effect remains green. However, the impact may be improved to 'pale blue' (minor/localised improvement) if the additional mitigation measures (notably the improvements to the River Cole) are maximised.	
	Physico-Chemical status									
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possible, red = likely)	Not required. Upstream water body not impacted by Scheme.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	No additional mitigation required.	No additional mitigation required.	No significant effects predicted	-
	6. pH	High	-		Not required. Upstream water body not impacted by Scheme.					
	7. Phosphate	Good	-		Not required. Upstream water body not impacted by Scheme.					
	8. Ammonia	High	-		Not required. Upstream water body not impacted by Scheme.					
	9. Temperature	-	-		Not required. Upstream water body not impacted by Scheme.					
	10. Specific Pollutants (Annex VIII)	High	-		Not required. Upstream water body not impacted by Scheme.					
	Hydromorphological status									**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possible, red = likely)	Not required. Upstream water body not impacted by Scheme.	• The existing water body is defined as a HMWB but appears to have a natural channel form in a wide floodplain in this area. The channel appears to have been historically straightened in the reach that is proposed for realignment (meandering) • The opportunity to reinstate meanders means that overall the river diversion is considered to be beneficial, if replicating planform geometry and channel form of the non-impacted meandering reaches is a priority component of the detailed design • Other crossings of the River Cole and its tributaries are likely to have isolated and minor deteriorating effects, which can be mitigated effectively • Overall there is not considered to be a distinctive deterioration or improvement	Undertake hydromorphological surveys to aid detailed design Incorporate hydromorphological measures into detailed design where practicable. Mitigation measures may include: • Create low flow channels in over-widened/over-deepened channels • Create reed fringes • Introduce riparian vegetation/green corridors where space allows • Recreate a sinuous river channel (re-meandering) where space allows • Retain marginal vegetation • Use of engineering techniques to assist natural recovery • Use soft engineering techniques		Neutral effect predicted	• water body as a whole is a designated HMWB, but is of natural form in this area • Channel is sinuous within a relatively large meander wavelength and amplitude • Channel appears to have been straightened in places, notably near to the M42 crossing • Map from the mid 1990s show that channel planform has not changed significantly for at least ca. 20 years. • Some palaeo features can be observed from aerial images in floodplain areas, but these are not immediately apparent, possible because of arable agriculture and ploughing • A disused moat near to the B4114 suggests that channel planform has not changed much at this location in the long term • Straightened reaches show evidence of bank erosion suggesting channel is trying to regain sinuosity • Meandering reaches show diverse bed morphology with numerous in-channel bars
	12. Connection to Groundwater	-	-		Not required. Upstream water body not impacted by Scheme.					• Not significant to hydromorphology
	13. River continuity	-	-		Not required. Upstream water body not impacted by Scheme.					• Channel is set in well developed floodplain with good connectivity • Channel is crossed by M42, B4114 and minor roads • M42 is an extended culvert
	14. River depth and width variation bed	-	-		Not required. Upstream water body not impacted by Scheme.					• Generally heterogeneous due to sinuosity, meanders and bars • Appears to be relatively homogeneous in straightened reaches • Depth variations are likely to be in a regular sequence and likely to include a well developed pool - riffle sequence • Channel width appears to be increased in straightened reach near the M42, either as channel tries to regain sinuosity, or as engineered set back of banks to mitigate flood risk around M42 culvert • Evidence of significant local bank erosion and chute channel near farm crossing near B4114. which may be due to tree in channel or cattle access to channel and poaching
	15. Structure and substrate of river bed	-	-		Not required. Upstream water body not impacted by Scheme.					• Low, medium, calcareous RBMP channel type • Developed in alluvium (clay, silt, sand, gravel) over Mercia Mudstone. No faults mapped at the site that would suggest an influence on channel form • Channel sediments likely to be gravel matrix with sands silts and clays; possibly dominated by gravel if fines can be deposited onto the floodplain
	16. Structure of riparian zone	-	-		Not required. Upstream water body not impacted by Scheme.					• Well developed and vegetated. • Good riparian and floodplain connectivity • Adjacent land use is managed pasture and possibly arable crops right up to bank tops

B. Risk screening of potential to prevent future attainment of good WFD status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	Identified chemical impacts						
Educate landowners on sensitive management practices (urbanisation)	-	In place	Predicted change to status elements (green = none, amber = possible, red = likely)	Not required. Upstream water body not impacted by Scheme.	No impact on this objective	No additional mitigation required.	No additional mitigation required.		-
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	-	In place		Not required. Upstream water body not impacted by Scheme.	The river diversion will result in the creation of an extra 300m of watercourse, with channel and riparian habitats. The scheme is therefore considered to contribute to this objective.				
Increase in-channel morphological diversity	-	In place		Not required. Upstream water body not impacted by Scheme.	The river diversion will result in the creation of an extra 300m of watercourse, with channel and riparian habitats. The scheme is therefore considered to contribute to this objective.				
Preserve and where possible restore historic aquatic habitats	-	In place		Not required. Upstream water body not impacted by Scheme.	The scheme will result in the temporary loss of a 600m section of the existing R Cole, although there will be an overall beneficial effect from the creation of the diverted channel.				
Operational and structural changes to locks, sluices, weirs, beach control, etc.	-	Not in place		Not required. Upstream water body not impacted by Scheme.	No impact on this objective				

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Bromford Bored Tunnel				Washwood Heath Brook Diversion			River Diversion - Dunlop Channel				Culvert - Dunlop Channel (on diversion)						River Diversion - River Tame (950 m) (Park Hall Nature Reserve)			
GB104027004840				Bored tunnel, with strengthening slab installed onto bed of River Tame. Details of construction methods for installation of strengthening slab not available, but may involve temporary disruption of the River Tame and will defined as part of the detailed design. CoCP measures will include measures to protect watercourse from contamination during construction. Any dewaterings from tunnel construction and drainage will be returned to the Tame in nearby area.				The proposed scheme will permanently redivert the Washwood Heath Brook to a new channel that pass through a culvert under Wolsley Driver (approximately 750m in length) and will enter the Tame approx. 100 m downstream of existing confluence.			Diversion of approximately 140 m of Dunlop Channel to pass under the proposed scheme and join the River Tame. Crossing of scheme includes culvert assessed separately (see 'Culvert - Dunlop Channel').				Two 5m span culvert under railway and road on minor watercourse. Each culvert approximately 40m in length.					Diversion of approximately 950m of the River Tame in order to facilitate the mainline of the proposed scheme. Proposed route will be along northern edge of Park Hall nature reserve, running parallel and south the existing alignment and re-joining the existing channel near Minworth STW.			
River Tame from Conf of the two arms to R Blythe	Moderate	Good Ecological Potential by 2027	**Identified biological impacts**	Noise and Vibration	Disruption/ contamination of watercourse during construction	Dewatering	Landtake (for slab or other surface infrastructure overlaying tunnel)	Landtake	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Creation of new habitats	Noise and vibration	Landtake leading to loss of habitat	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Creation of new habitats	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake leading to loss of habitat	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Creation of new habitats
WFD classification elements	**1.Macrophytes and phytobenthos - diatoms**	N/A	N/A	**Predicted change to status elements (green = none, amber = possibly, red = likely)**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	n/a	-		Receptor is insensitive to impact	Likely temporary and localised effects on macroinvertebrates in the Tame during construction.	No measurable effects on macrophytes likely - receptor not highly sensitive to impact. Baseline and EA data suggest, macroinvertebrates likely to be negligible and dewatrings to be returned to Tame.	Although there is no status for macrophytes, HS2 baseline surveys show there is a limited diversity of macrophytes within the River Tame (Natural Habitats sq). The receptor is likely to be negligible and dewatering to be returned to Tame.	The section that will be diverted is currently culverted for much of its length in this area and thus the new channel will decrease culverting significantly. Therefore there will be no net loss of habitat due to landtake and as much of the watercourse is currently shaded there will be overall adverse effect on macrophytes from this impact.	Likely improvements due to the Brook being taken out of the culvert, with beneficial effects on macrophytes.	Washwood Heath Brook will be significantly improved in terms of macrophytes, as culverting will be significantly decreased and it be an open channel of greater morphological and habitat diversity. The channel will provide habitats such as riffles, berms and other features that locally increase sinuosity and promote greater diversity of flows and habitats that would favour colonisation of macrophytes. Localised improvement in macrophyte diversity.	Receptor is insensitive to impact	Although there is no status for macrophytes, HS2 baseline surveys show that the Dunlop Channel is characterised by low macrophyte diversity. The impact is likely to lead to a temporary deterioration of approximately 140m , likely to lead to a minor short-term adverse effects on macrophytes while new channel re-establishes. In the longer term, there would be no overall effect on macrophytes and there are limited opportunities for an improvement of quality.	Very limited improvement due to changes in river processes, which may favour improved macrophyte habitat and macrophyte colonisation. Possible localised improvements.	Possible improved habitat, improved bank/channel profile, inclusion of varying substrate in the new diverted channel proposed in the new diverted channel.	Receptor is insensitive to impact	Landtake will lead to direct loss of macrophytes while channel re-profiling will reduce the habitats available for colonisation within the Dunlop Channel. Although there is no status for macrophytes in the Dunlop Channel and no improvements in habitat elsewhere with mitigate any significant loss of habitat.	Shading will reduce photosynthetic activity in macrophyte communities leading to reduced biomass, and potentially a change in community composition within the shaded area. However, the culvert is relatively short (in a channel with limited macrophyte diversity. Improvements within the channel or elsewhere within River Tame will mitigate any significant loss of macrophytes.	Change to channel hydraulics may result localised and downstream changes in flow velocity. Increased velocity may cause wash out of macroinvertebrate communities. Reduction in velocity may increase accretion leading to establishment of vegetation and loss of high DI dependent macroinvertebrate communities. However, there is very little in the way of sensitive fish habitat in the culvert affected so it's not likely that an effect would be suffered.	Track drainage from bridges will be mitigated and therefore no change in status for physico-chemical quality that would effect macrophytes is anticipated.	Although there is no status for macrophytes, HS2 baseline surveys show that this section of the Tame includes areas of emergent and submerged vegetation, notably Ranunculus sp. in shallower areas. The impact is likely to lead to a temporary deterioration of approximately 1 km of habitat and a short-term adverse effect on abundance and diversity of macrophytes while new channel re-establishes. As there will be no change in hydraulic gradients and the cross section profile and habitats will be as good or better for macrophytes than the current situation, there would be no long term effects.	Limited improvement due to changes in river processes (possible scour and downstream formation of bars etc.), which may favour improved habitat and macrophyte colonisation. Localised improvements anticipated.	Post-construction cross-section of channel will have less steep banks and shallow marginal areas, providing greater habitat for marginal vegetation. The hydraulic gradient will not change but the design will include features such as riffles, berms and other features that locally increase sinuosity and promote greater diversity of flows and habitats that would favour colonisation of macrophytes (such as the species present in the current channel). Possible localised minor improvement in macrophyte diversity.
	3. Macroinvertebrates	Poor	-		Receptor is insensitive to impact	Likely temporary and localised effects on macroinvertebrates in the Tame during construction. However, effects likely to be minor or negligible as receptor not highly sensitive to impacts (baseline and EA data suggest macroinvertebrates of poor quality and low sensitivity)	No measurable effects on macroinvertebrates likely - receptor not highly sensitive to impact (baseline and EA data suggest, macroinvertebrates of poor quality and low sensitivity), changes to flow from dewatering likely to be negligible and dewatrings to be returned to Tame.	Highly localised deterioration of invertebrate habitat, likely to lead to a localised, short-term adverse effect on macroinvertebrate abundance and diversity. However, invertebrate habitat and diversity are currently poor within the stretch impacted.	The section that will be diverted is currently culverted for much of its length in this area and thus the new channel will decrease culverting significantly. As all of the channel in this area is currently culverted and culverted through much of its length, there will be no net loss of invertebrate habitat due to landtake and there will be overall adverse effect on macroinvertebrates from this impact.	Likely improvements due to the Brook being taken out of the culvert, with beneficial effects on macroinvertebrates.	Washwood Heath Brook will be of improved quality in terms of invertebrate habit. The new channel will reduce culverting significantly, open up the channel and the design will include features such as riffles, berms and other features that locally increase sinuosity and promote greater diversity of flows and habitats that would favour colonisation of macroinvertebrates . Localised improvement in macroinvertebrate quality.	Receptor is insensitive to impact	Temporary localised deterioration of invertebrate habitat (while new channel re-establishes), likely to lead to a localised, short-term adverse effect on macroinvertebrate abundance and diversity. However, as invertebrate habitat and diversity are poor within the stretch impacted and the limited extent of the diversion, the invertebrate communities are likely to recover to a similar quality within a few months.	Very limited improvement to invertebrate habitat due to changes in river processes. Possible localised improvements.	Possible improved habitat, improved bank/channel profile, inclusion of varying substrate in the new diverted channel proposed in the new diverted channel. Ultimately, invertebrates will be limited by the background water quality.	Receptor is insensitive to impact	Landtake will lead to direct loss of macroinvertebrates while channel re-profiling will reduce the habitats available for colonisation within the Dunlop Channel. However, the channel is relatively short and there is limited diversity of macroinvertebrates in the Dunlop Channel habitat is poor. Mitigation measures elsewhere in the Dunlop Channel and River Tame will mitigate any significant effects on macroinvertebrates.	Shading will be a localised impact with no anticipated effects on the wider water body.	Change to channel hydraulics may result localised and downstream changes in flow velocity. Increased velocity may cause wash out of macroinvertebrate communities. Reduction in velocity may increase accretion leading to blocking of interstitial spaces and loss of high DI dependent macroinvertebrate communities. However, the length affected is short in relation to the Dunlop Channel and River Tame water body and the invertebrate community is relatively tolerant of poor water quality. Therefore any effects are likely to be spatially negligible.	Track drainage from bridges will be mitigated and therefore no change in status for physico-chemical quality affecting invertebrates is anticipated.	Temporary deterioration of approximately 1 km of fish habitat (while new channel re-established). Hydraulic characteristics will not change and there will be no other barrier to fish passage. The fish species present include bullhead (Cottus gobio)(EU Habitats Directive Annexe II) , but are generally are of poor quality (based on WFD status and survey data) and will recolonise the new section quickly.	Limited improvement to invertebrate habitat, due to changes in river processes (possible scour and downstream formation of bars etc.). Localised increases in flow velocity and turbulence at crossing unlikely to act as a barrier to fish.	Improved invertebrate habitat, due to the inclusion features such as riffles, berms etc. (see above) proposed in the new diverted channel. Ultimately, the invertebrate diversity will be limited by the background water quality of the River Tame.
	4. Fish	Poor	-		Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). However, effects are likely to be temporary and localised.	Likely temporary and localised effects on fish in the Tame during construction. However, effects likely to be minor or negligible as receptor not highly sensitive to impacts (baseline and EA data fish and fish habitat of poor quality and low sensitivity)	No measurable effects on fish likely - receptor not highly sensitive to impact (baseline and EA data suggest fish of poor quality and low sensitivity), changes to flow from dewatering likely to be negligible and dewatrings to be returned to Tame.	Highly localised deterioration of fish habitat, which will lead to a spatially negligible effect. However, fish habitat and diversity are currently poor within the stretch impacted.	The section that will be diverted is currently culverted for much of its length in this area and thus the new channel will decrease culverting significantly. As all of the channel in this area is currently culverted and culverted through much of its length, there will be no net loss of invertebrate habitat due to landtake and there will be overall adverse effect on macroinvertebrates from this impact.	Likely improvements due to the Brook being taken out of the culvert, with beneficial effects on fish.	Washwood Heath Brook will be of improved quality in terms of invertebrate fish. The new channel will increase culverting significantly. As all of the channel in this area is currently culverted and culverted through much of its length, there will be no net loss of invertebrate habitat due to landtake and there will be overall adverse effect on macroinvertebrates from this impact.	Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). However, effects are likely to be temporary and localised.	Temporary localised deterioration of approximately 120 m of fish habitat. Hydraulic characteristics of the channel will not change. No data on fish species were collected, but habitat and water quality were recorded as being poor and not likely to support a diverse fish population.	Limited improvement to fish habitat, due to changes in river processes, however, fish species diversity in the channel are likely to be very low (given poor water quality, habitat and low flow). Therefore there is not likely to be any measurable improvement	Possible improved fish habitat, improved bank/channel profile, inclusion of varying substrate in the new diverted channel. Ultimately, the fish community will be limited by the background water quality.	Noise and vibration may cause mortality or injury at high levels and behavioural responses at low levels, which would be limited to the vicinity of the noise source. Dunlop Channel is not considered to be of high importance for fish, although no fish survey data were available. Therefore only minor, temporary and localised effects are likely.	Landtake is unlikely to result in direct mortality of fish and Dunlop Channel is not considered to be of high importance for fish populations. Most habitat loss will be mitigated by improvements in the Dunlop Channel or River Tame. Possible minor, localised loss of low quality habitat. The culvert will be appropriately designed so not to act as a barrier to any future migrating fish that may colonise the Dunlop Channel or upstream watercourses.	Shading will be a localised impact with no anticipated effects on the wider water body.	Change to channel hydraulics may result localised and downstream changes in flow velocity. However, there is very little in the way of sensitive fish habitat in the culvert affected so it's not likely that an effect would be suffered.	Track drainage from bridges will be mitigated and therefore no change in status for physico-chemical quality affecting fish is anticipated.	Temporary deterioration of approximately 1 km of fish habitat (while new channel re-established). Hydraulic characteristics will not change and there will be no other barrier to fish passage. The fish species present include bullhead (Cottus gobio)(EU Habitats Directive Annexe II) , but are generally are of poor quality (based on WFD status and survey data) and will recolonise the new section quickly.	Limited improvement to fish habitat, due to changes in river processes (possible scour and downstream formation of bars etc.). Localised increases in flow velocity and turbulence at crossing unlikely to act as a barrier to fish.	Improved fish habitat (e.g. fish refuges etc.), due to features such as riffles, berms etc. (see above) proposed in the new diverted channel. However fish species present will be limited by the background quality of the River Tame.
	Physico-Chemical status																							
	5. Dissolved Oxygen	High	-	**Predicted change to status elements (green = none, amber = possibly, red = likely)**	N/A	N/A	Effects from dewatering likely to be negligible and dewatrings to be returned to Tame.	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including bake-ring/dampers) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor beneficial with no degradation of current status anticipated.	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • Realistically, the effects of urbanisation in the rest of the catchment and the space available for habitat betterment mean that there are unlikely to be	N/A	N/A	Due to the short length of the culvert, there is unlikely to be any impact on dissolved oxygen. Any impact is likely to have a local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.
	6. pH	High	-		N/A	N/A	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact
	7. Phosphate	Bad	-		N/A	N/A	Effects from dewatering likely to be negligible and dewatrings to be returned to Tame.	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change	Receptor is insensitive to impact	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact
	8. Ammonia	Poor	-		N/A	N/A	Effects from dewatering likely to be negligible and dewatrings to be returned to Tame.	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact
	9. Temperature	-	-		N/A	N/A	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the short length of the culvert, there is unlikely to be any impact on temperature. Any impact is likely to have a local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	Effects from dewatering likely to be negligible and dewatrings to be returned to Tame.	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact
	Hydromorphological status																							
	11. Quantity and dynamics of river flow	-	-	**May prevent implementation of RBMP measure (green = No risk, amber = possible risk, red = likely risk)**	N/A	Likely temporary effects of flow diversion during the construction phase	Effects from dewatering likely to be negligible and dewatrings to be returned to Tame.	It is assumed that the base slab would be set well below the bed surface to allow continuation of surface infrastructure encroaching into the channel, so hydrodynamics would not be affected outside of the construction phase	N/A	• Existing channel is predominantly culverted • Proposed realignment includes 750m of open watercourse, but still includes 300 m culvert, and adjacent floodplain is currently not used for storage. Therefore there is no loss of floodplain • Lengthening the existing watercourse may reduce flow velocities, but on balance daylighting is considered to be overwhelmingly beneficial	• Diversion would create 750m of new open channel	N/A	N/A	• Proposed realignment is also mainly straight due to space constraints • Retention of abandoned channel to provide wetlands habitat would help to reduce accelerated flows in straightened channel	• Retention of abandoned channel would provide wetlands habitat	N/A	N/A	N/A	• River diversions for the Dunlop Channel through one new culvert (and one replacement culvert) will have slight impacts on hydrodynamics, local flow velocity and turbulence. • Peak flows could be constrained by culvert dimensions • Out of bank flows would be disconnected	N/A	N/A	N/A	• Proposed realignment is also mainly straight due to space constraints • Retention of abandoned channel to provide wetlands habitat would help to reduce accelerated flows in straightened channel	• Retention of abandoned channel would provide wetlands habitat
	12. Connection to Groundwater	-	-		N/A	Effects from dewatering likely to be negligible and dewatrings to be returned to Tame.	Effects from dewatering likely to be negligible and dewatrings to be returned to Tame.	Effects from dewatering likely to be negligible and dewatrings to be returned to Tame.	N/A	• Not significant to hydromorphology	• Not significant to hydromorphology	N/A	N/A	• Not significant to hydromorphology	• Not significant to hydromorphology	N/A	N/A	N/A		N/A	N/A	N/A	• Not significant to hydromorphology	• Not significant to hydromorphology
	13. River continuity	-	-		N/A	Likely temporary effects on river continuity during the construction phase due to the need for flow diversion	Effects from dewatering likely to be negligible and dewatrings to be returned to Tame.	It is assumed that the base slab would be set well below the bed surface to allow continuation of substrate transport, so any construction effects would be temporary and highly localised, with natural recovery of the existing bed structure following construction. The risk of temporary and localised disruption to river continuity is however, acknowledged	N/A	• Daylighting culvert is a strong benefit, even though the watercourse will continue to existing in heavily urbanised and industrialised catchment	• Diversion would create 750m of new open channel	N/A	N/A	• Two light bends to route the stream under the new railway line could cause local increases in flow velocity and turbulence at crossing	• A wetlands habitat would improve local habitats, but they would remain fragmented	N/A	N/A	N/A	• Local scour, and the need for scour protection around the structures, could result in a stepped last around the culvert, which could impede species migration. • Culverts sever bank, riparian and floodplain continuity • The culvert is short, and effects would probably be localised	N/A	N/A	N/A	• Two light bends to route the stream under the new railway line could cause local increases in flow velocity and turbulence at crossing	• A wetlands habitat would improve local habitats, but they would remain fragmented
	14. River depth and width variation bed	-	-		N/A	Likely temporary effects on river continuity during the construction phase due to the need for flow diversion	Effects from dewatering likely to be negligible and dewatrings to be returned to Tame.	It is assumed that the base slab would be set well below the bed surface to allow continuation of substrate transport, so any construction effects would be temporary and highly localised, with natural recovery of the existing bed structure (i.e. flow and substrate depth) following construction. The risk of temporary and localised disruption to river continuity is however, acknowledged	N/A	• Likely to be no difference in channel dimensions. The new channel will be mainly straight due to space constraints but will have two bends. The channel will be approximately 10 m wider, but overall morphological diversity or major habitat improvement is not practicable	N/A	N/A	N/A	• Some local variance in channel depth, width and thalweg would promote some diversity in otherwise straightened channel, but bends are unnaturally tight, so overall effect would probably balance out as neither beneficial nor adverse	• Creation of a backwater wetland habitat would be an improvement relative to the homogenised channel	N/A	N/A	N/A	• Out of bank flows would be cut off so channel width could be restricted at high flow. Local scour may result in some diversity in channel geometry	N/A	N/A	N/A	• Some local variance in channel depth, width and thalweg would promote some diversity in otherwise straightened channel, but bends are unnaturally tight, so overall effect would probably balance out as neither beneficial nor adverse	• Creation of a backwater wetland habitat would be an improvement relative to the homogenised channel
	15. Structure and substrate of river bed	-	-		N/A	Likely temporary effects on the river bed during the construction phase due to inevitable release of some increased sediment into the channel.	Effects from dewatering likely to be negligible and dewatrings to be returned to Tame.	It is assumed that the base slab would be set well below the bed surface to allow continuation of substrate transport, so any construction effects would be temporary and highly localised, with natural recovery of the existing bed structure following construction	N/A	• Nature of the upstream catchment probably means there are no natural substrates delivered to this area	• Some gravels could be put in place but significant morphological diversity or major habitat improvement is not practicable for a channel this size.	N/A	N/A	• The tight bends at the crossing point may result in local scour and possibly formation of bars immediately downstream as a result of localised changes inflow properties. This could promote some bed habitat diversity	• Creation of a backwater wetland habitat would be an improvement relative to the homogenised channel	N/A	N/A	N/A	• Tight bends for the channel diversion could result in local turbulence and scour, which could adversely serve to destabilise the bed habitat diversity • Substrates likely to be lost if culvert base is not set well below bed level.	N/A	N/A	N/A	• The tight bends at the crossing point may result in local scour and possibly formation of bars immediately downstream as a result of localised changes inflow properties. This could promote some bed habitat diversity	• Creation of a backwater wetland habitat would be an improvement relative to the homogenised channel • Sediment quality inherited from the urbanised catchment is likely to limit ecological potential because the area have behave as a sediment and contaminant sink
	16. Structure of riparian zone	-	-		N/A	The base slab would not impact riparian zones	Effects from dewatering likely to be negligible and dewatrings to be returned to Tame.	The base slab would not impact riparian zones	N/A	• A green corridor could be implemented, but extensive upstream culverting is likely to mean there would be little hydraulic connectivity to out-of-channel areas	• A green corridor could be implemented, but its width would be limited by space constraints for adjacent land-use	N/A	N/A	• No net change to existing bank, riparian and floodplain structure and connectivity with channel	• No net change to existing bank, riparian and floodplain structure and connectivity with channel	N/A	N/A	N/A	• Direct loss of channel banks and riparian zone. • bank protection to control realignments could be discontinuous to natural banks, and could prevent natural sediment inputs to the channel.	N/A	N/A	N/A	• No net change to existing bank, riparian and floodplain structure and connectivity with channel	• No net change to existing bank, riparian and floodplain structure and connectivity with channel

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve Objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen																						
Educate landowners on sensitive management practices (urbanisation)	In Place	-		-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-	-	-	-	• Scale of this particular crossing means there is unlikely to be a proportional opportunity to implement significant wider water body improvements, but opportunities must be investigated	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-
Ensure that the thermal regime in waters downstream of the impounding works is consistent with good status conditions	In Place	-		-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-	-	-	-	-	-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-
Ensure that good status of dissolved oxygen levels is being achieved downstream of the impounding works.	In Place	-		-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-	-	-	-	-	-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	In Place	-		-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-	-	-	-	-	-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-
Increase in-channel morphological diversity.	In Place	-		-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-	-	-	-	-	-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-
Removal of hard bank reinforcement / revetment, or replacement with soft engineering solution	In Place	-		-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-	-	-	-	-	-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-
Ensure there is an appropriate baseline flow regime downstream of the impoundment.	Not in place	-		-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-	-	-	-	-	-	-	-	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-
Operational and structural changes to locks, sluices, weirs, beach control, etc.	Not in place	-		-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-	-	-	-	-	-	-	-	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-
Structures or other mechanisms in place and managed to enable fish to access waters upstream and downstream of the impounding	Not in place	-		-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-	-	-	-	-	-	-	-	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-
Preserve and, where possible, restore historic aquatic habitats	Not in place	-		-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	-	-	-	-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-
Re-engineering of the river where the flow regime cannot be modified.	Not in place	-		-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	-	-	-	-	-	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	River Tame Viaduct (Birmingham Spur)					Water Orton Viaduct No1, Water Orton Viaduct No3 & River Tame Viaduct 164 L3 - Crossing of the River Tame					Water Orton viaduct no.1, 3 and 4, Water Orton Rail underbridge/viaduct 164-S1 Chattle Hill viaduct 164-L1, and associated structures - Crossings of minor River Tame tributaries (Ordinary Watercourses)					
	GB104027004840				775m long viaduct. Two footings within the river bed (in new diverted section of channel), causing localised loss of habitat.					Carrying the HS2 Up North Line. Approx. 1357m in length.					Various crossings on minor tributaries of the River Tame and feeder trains, including culverts, viaduct crossings and minor diversions					
	River Tame from Conf of the two arms to R Blythe	Moderate	Good Ecological Potential by 2027	Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Creation of new habitats
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	n/a	-		Receptor is insensitive to impact	Landtake will reduce the habitats available for colonisation within directly affected area. Invertebrate community at poor status, is already impacted by poor water quality and considered relatively insensitive (based on biotic scores). Effect likely to be minor, localised and temporary impact. Mitigation measures to improve habitat of the Tame (diverted section) will be provided in the diverted Tame channel.	Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. However, macrophyte diversity and abundance in the Tame is relatively low and there would only be a localised and minor effects on macrophyte communities, not affecting the status of this quality element. Mitigation measures are considered as part of the diversion of the River Tame.	Change to channel hydraulics will result in localised increase in flow velocity downstream of crossing and lead to scouring of habitat in vicinity. However, this would be highly localised and minor and the fish community are not highly sensitive so it would not further degrade status in the medium to long term. Therefore there would only be a minor and localised/temporary impact.	No anticipated change in water quality	Receptor is insensitive to impact	Landtake will reduce the habitats available for colonisation within directly affected area. Invertebrate community at poor status, is already impacted by poor water quality and considered relatively insensitive (based on biotic scores). Effect likely to be minor, localised and temporary impact. Mitigation measures to improve habitat of the Tame (diverted section) will be provided in the diverted Tame channel.	Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. However, macrophyte diversity and abundance in the Tame is relatively low and there would only be a localised and minor effects on macrophyte communities, not affecting the status of this quality element. Mitigation measures are considered as part of the diversion of the River Tame.	Change to channel hydraulics will result in localised increase in flow velocity downstream of crossing and lead to scouring of habitat in vicinity. However, this would be highly localised and minor and the fish community are not highly sensitive so it would not further degrade status in the medium to long term. Therefore there would only be a minor and localised/temporary impact.	No anticipated change in water quality	Receptor is insensitive to impact	Landtake will lead to direct loss of any macrophytes and reduce the availability of macrophyte habitats within the area directly affected by landtake. No data are available on macrophytes distribution in these minor watercourses. However, given the relative size of the tributaries and the apparent channel modifications etc. any effects are likely to be relatively minor and will not effect the status of this element at the water body level.	Shading will reduce photosynthetic activity in macrophyte communities leading to reduced biomass, and potentially a change in community composition within the shaded areas. However, given the relative size of the tributaries and the apparent channel modifications etc. any effects are likely to be relatively minor and will not effect the status of this element at the water body level.	Change to channel hydraulics may result localised and downstream changes in flow velocity. Increased velocity may cause wash out of macrophyte communities. Reduction in velocity may increase accretion leading to establishment of species with a higher RMNI. However, given the relative size of the tributaries and the apparent channel modifications etc. any effects are likely to be relatively minor and will not effect the status of this element at the water body level.	Track drainage from bridges will be mitigated and therefore no change in status for macrophytes element is anticipated.	Where possible, scheme elements such as diversions will allow for the creation of new or improved habitats (improvements to bank profile, inclusion shallow marginal areas., riffles, berms etc.), providing greater habitat for marginal vegetation. Possible localised minor improvement in macrophyte diversity.
	3. Macroinvertebrates	Poor	-		Receptor is insensitive to impact	Landtake will reduce the habitats available for colonisation within directly affected area. Invertebrate community at poor status, is already impacted by poor water quality and considered relatively insensitive (based on biotic scores). Effect likely to be minor, localised and temporary impact. Mitigation measures to improve habitat of the Tame (diverted section) will be provided in the diverted Tame channel.	Shading will be a localised impact with no anticipated effects on the wider water body.	Change to channel hydraulics will result in localised increase in flow velocity downstream of crossing and lead to scouring of habitat in vicinity. However, this would be highly localised and minor and the fish community are not highly sensitive so it would not further degrade status in the medium to long term. Therefore there would only be a minor and localised/temporary impact.	No anticipated change in water quality	Receptor is insensitive to impact	Landtake will reduce the habitats available for colonisation within directly affected area. Invertebrate community at poor status, is already impacted by poor water quality and considered relatively insensitive (based on biotic scores). Effect likely to be minor, localised and temporary impact. Mitigation measures to improve habitat of the Tame (diverted section) will be provided in the diverted Tame channel.	Shading will be a localised impact with no anticipated effects on the wider water body.	Change to channel hydraulics will result in localised increase in flow velocity downstream of crossing and lead to scouring of habitat in vicinity. However, this would be highly localised and minor and the fish community are not highly sensitive so it would not further degrade status in the medium to long term. Therefore there would only be a minor and localised/temporary impact.	No anticipated change in water quality	Receptor is insensitive to impact	Landtake will lead to direct loss of any macroinvertebrates and reduce the availability of habitats within the area. No data are available on macroinvertebrate distribution in these minor watercourses. However, given the relative size of the tributaries and the apparent channel modifications etc. any effects are likely to be relatively minor and will not effect the status of this element at the water body level.	Shading will be a localised impact with no anticipated effects on the wider water body.	Change to channel hydraulics may result localised and downstream changes in flow velocity. Increased velocity may cause wash out of macroinvertebrate communities. Reduction in velocity may increase accretion leading to establishment of species with a high GO deposited macroinvertebrate communities. However, given the relative size of the tributaries and the apparent channel modifications etc. any effects are likely to be relatively minor and will not effect the status of this element at the water body level.	Track drainage from bridges will be mitigated and therefore no change in status for macroinvertebrates is anticipated.	Where possible, scheme elements will include provision for improved invertebrate habitat, due to the inclusion features such as riffles, berms etc. in new diverted channel. Possible localised minor improvement in macroinvertebrate quality.
	4. Fish	Poor	-		Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). However, effects are likely to be temporary and localised.	Landtake will lead to the localised loss of fish habitat. Effects would be minor, localised and temporary effect. Mitigation measures to improve habitat of the Tame (diverted section) will be provided in the diverted Tame channel.	No anticipated effect.	Change to channel hydraulics will result in localised increase in flow velocity downstream of crossing and lead to scouring of habitat in vicinity. However, this would be highly localised and minor and the fish community are not highly sensitive so it would not further degrade status in the medium to long term. Therefore there would only be a minor and localised/temporary impact.	No anticipated change in water quality	Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). However, effects are likely to be temporary and localised.	Landtake will lead to the localised loss of fish habitat. Effects would be minor, localised and temporary effect. Mitigation measures to improve habitat of the Tame (diverted section) will be provided in the diverted Tame channel.	No anticipated effect.	Change to channel hydraulics will result in localised increase in flow velocity downstream of crossing and lead to scouring of habitat in vicinity. However, this would be highly localised and minor and the fish community are not highly sensitive so it would not further degrade status in the medium to long term. Therefore there would only be a minor and localised/temporary impact.	No anticipated change in water quality	Noise and vibration may cause mortality or injury at high levels and behavioural responses, but effects will be localised limited to the vicinity of the noise source. However, these minor tributaries and feeder drains are considered to be of very importance for fish (although no survey data were available). Therefore only minor, temporary and localised effects are likely.	Landtake is unlikely to result in direct mortality of fish but will reduce the availability of habitats. However, given the relative size of the tributaries, their use and the apparent channel modifications etc. they are unlikely to be of significant importance for fish habitat for feeding and spawning. Therefore any effects are likely to be minor and spatially negligible and will not effect the status of this element at the water body level.	Shading will be a localised impact with no anticipated effects on the wider water body.	Change to channel hydraulics may result localised and downstream changes in flow velocity. However, given the relative size of the tributaries, their use and the apparent channel modifications etc. they are unlikely to be of significant importance for fish habitat for feeding and spawning. Therefore any effects are likely to be minor and spatially negligible and will not effect the status of this element at the water body level.	Track drainage from bridges will be mitigated and therefore no change in status for fish is anticipated.	Where possible, scheme elements will include provision for improved fish habitat (e.g. fish refuges etc.) due to the inclusion features such as riffles, berms etc. in new diverted channel. Possible localised minor improvement in macroinvertebrate quality
	Physico-Chemical status																			
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor beneficial with no degradation of current status anticipated.
	6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	7. Phosphate	Bad	-		N/A	N/A	N/A	ffectively an open span bridge, so there would be no i	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	N/A	N/A	ffectively an open span bridge, so there would be no i	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	N/A	N/A	ffectively an open span bridge, so there would be no i	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	Receptor is insensitive to impact
	8. Ammonia	Poor	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	9. Temperature	-	-		N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	Receptor is insensitive to impact
	Hydromorphological status																			
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	Footings in the watercourse would narrow the channel and cause local increase in flow velocity and turbulence. This would promote some hydraulic habitat diversity, but the bends would be unnaturally tight and the would probably be no ecological benefit	N/A	N/A	N/A	N/A	• Footings in the watercourse would narrow the channel and cause local increase in flow velocity and turbulence. This would promote some hydraulic habitat diversity, but the bends would be unnaturally tight and the would probably be no ecological benefit	N/A	N/A	N/A	N/A	• Footings in the watercourse would narrow the channel and cause local increase in flow velocity and turbulence. This would promote some hydraulic habitat diversity, but the bends would be unnaturally tight and the would probably be no ecological benefit	N/A	• Retention of abandoned channel would provide wetlands habitat
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	• Not significant to hydromorphology	N/A	N/A	N/A	N/A	• Not significant to hydromorphology	N/A	N/A	N/A	N/A	• Not significant to hydromorphology	N/A	• Not significant to hydromorphology
	13. River continuity	-	-		N/A	N/A	N/A	• Footings in the watercourse would decrease continuity by the presence of physical obstacles and locally increased flow velocity and turbulence	N/A	N/A	N/A	N/A	• Footings in the watercourse would decrease continuity by the presence of physical obstacles and locally increased flow velocity and turbulence	N/A	N/A	N/A	N/A	• Footings in the watercourse would decrease continuity by the presence of physical obstacles and locally increased flow velocity and turbulence	N/A	• A wetlands habitat would improve local habitats, but they would remain fragmented
	14. River depth and width variation bed	-	-		N/A	N/A	N/A	• Some localised scour is likely, but is unlikely to cause major deterioration; and promote some local diversity in hydraulic and bed habitats if substrates are deposited as bar formations immediately downstream	N/A	N/A	N/A	N/A	• Some localised scour is likely, but is unlikely to cause major deterioration; and promote some local diversity in hydraulic and bed habitats if substrates are deposited as bar formations immediately downstream	N/A	N/A	N/A	N/A	• Some localised scour is likely, but is unlikely to cause major deterioration; and promote some local diversity in hydraulic and bed habitats if substrates are deposited as bar formations immediately downstream	N/A	• Creation of a backwater wetland habitat would be an improvement relative to the homogenised channel
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• Some localised scour is likely, but is unlikely to cause major deterioration; and promote some local diversity in hydraulic and bed habitats if substrates are deposited as bar formations immediately downstream	N/A	N/A	N/A	N/A	• Some localised scour is likely, but is unlikely to cause major deterioration; and promote some local diversity in hydraulic and bed habitats if substrates are deposited as bar formations immediately downstream	N/A	N/A	N/A	N/A	• Some localised scour is likely, but is unlikely to cause major deterioration; and promote some local diversity in hydraulic and bed habitats if substrates are deposited as bar formations immediately downstream	N/A	• Creation of a backwater wetland habitat would be an improvement relative to the homogenised channel • Sediment quality inherited from the urbanised catchment is likely to limit ecological potential because the area have behave as a sediment and contaminant sink
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	• Footings in the riparian zones would cause some loss and obstruction in riparian zone, but relative to the area open space in the Park Hall Nature Reserve this is likely to be insignificant	N/A	N/A	N/A	N/A	• Footings in the riparian zones would cause some loss and obstruction in riparian zone, but relative to the area open space in the Park Hall Nature Reserve this is likely to be insignificant	N/A	N/A	N/A	N/A	• Footings in the riparian zones would cause some loss and obstruction in riparian zone, but relative to the area open space in the Park Hall Nature Reserve this is likely to be insignificant	N/A	• No net change to existing bank, riparian and floodplain structure and connectivity with channel

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	May prevent implementation of RBMP measure (green = No risk, amber = possible risk, red = likely risk)																	
Educate landowners on sensitive management practices (urbanisation)	In Place	-		-	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-	-	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-	-	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-	-
Ensure that the thermal regime in waters downstream of the impounding works is consistent with good status conditions	In Place	-		-	-	-		-	-	-	-	-		-	-	-	-		-	-
Ensure that good status of dissolved oxygen levels is being achieved downstream of the impounding works	In Place	-		-	-	-		-	-	-	-	-		-	-	-	-		-	-
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	In Place	-		-	-	-		-	-	-	-	-		-	-	-	-		-	-
Increase in-channel morphological diversity	In Place	-		-	-	-		-	-	-	-	-		-	-	-	-		-	-
Removal of hard bank reinforcement / revetment, or replacement with soft engineering solution	In Place	-		-	-	-		-	-	-	-	-		-	-	-	-		-	-
Ensure there is an appropriate baseline flow regime downstream of the impoundment.	Not in place	-		-	-	-		-	-	-	-	-		-	-	-	-		-	-
Operational and structural changes to locks, sluices, weirs, beach control, etc.	Not in place	-		-	-	-		-	-	-	-	-		-	-	-	-		-	-
Structures or other mechanisms in place and managed to enable fish to access waters upstream and downstream of the impounding	Not in place	-		-	-	-		-	-	-	-	-		-	-	-	-		-	-
Preserve and, where possible, restore historic aquatic habitats	Not in place	-		-	-	-		-	-	-	-	-		-	-	-	-		-	-
Re-engineering of the river where the flow regime cannot be modified.	Not in place	-		-	-	-		-	-	-	-	-		-	-	-	-		-	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body GB104027044840	Current status	Status objective	Scheme Elements	Impacts from other WFD water bodies (assessed separately)	Overall impact on element	Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
							Construction	Operation		
	River Tame from Confl of the two arms to R Blythe	Moderate	Good Ecological Potential by 2027	**Identified biological impacts**						
WFD classification elements	**1.Macrophytes and phytobenthos - diatoms**	N/A	N/A	**Predicted change to status elements (green = none, amber = possibly, red = likely)**	N/A	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	n/a	-		No significant effects on upstream watercourses (River Rea, Plants Brook) anticipated.	The Tame does not have a status for macrophytes. However, site surveys (River Corridor Surveys etc.) suggest that this element is not of very high quality. Although the scheme will lead to loss of habitat and photosynthetic activity (in shaded areas) the scheme includes several opportunities for improved macrophyte habitats, notably in marginal areas of diverted sections. In particular, there are likely to be significant but localised beneficial effects due to the diversions and removal of culverts from the Washwood Heath Brook and the diversion of the River Tame at Park Hall Nature Reserve. The overall effect on this element is likely to be minor beneficial, if benefits from the scheme are maximised.	Careful consideration must be given to in stream works, notably for the construction method for the installation of the River Tame strengthening slab for the Bromford Tunnel works.	Measures to improve macrophyte habitat or mitigate any adverse effects form part of the embedded mitigation measures described previously, therefore no additional measures are required. These include channel habitat improvements on the diverted sections of River Tame, Washwood Heath Brook, Dunlop Channel and other minor tributaries. **The detailed design for the river diversions should be undertaken in consultation with the EA in order to ensure that these potential beneficial effects are maximised.**	Minor beneficial effects possible	-
	3. Macroinvertebrates	Poor	-		No significant effects on upstream watercourses (River Rea, Plants Brook) anticipated.	The field surveys supports the 'poor' WFD class for invertebrates in the River Tame. Most of the adverse effects on macroinvertebrates are minor and almost all are temporary. Given the current quality of macroinvertebrates, there are significant numbers of measures to permanently improve macroinvertebrate habitats within diverted river sections of up to 1 km. In particular, there are likely to be significant but localised beneficial effects associated with the diversions and removal of culverts from the Washwood Heath Brook and the diversion of the River Tame at Park Hall Nature Reserve. The overall effect on this element is likely to be minor beneficial provided that benefits from scheme elements (diversions) are maximised.		Measures to improve macroinvertebrate habitat and/or mitigate any adverse effects form part of the embedded mitigation measures described previously, therefore no additional measures are required. These include channel habitat improvements on the diverted sections of River Tame, Washwood Heath Brook, Dunlop Channel and other minor tributaries. **The detailed design for the river diversions should be undertaken in consultation with the EA in order to ensure that these potential beneficial effects are maximised.**		
	4. Fish	Poor	-		No significant effects on upstream watercourses (River Rea, Plants Brook) anticipated.	The status of fish in the Tame is currently poor, which is also supported by the baseline field data collected. Most of the adverse effects on fish are minor, almost all are temporary and the scheme will not cause barriers to fish migration (now or in the future, if conditions improve so that more migrating fish species are able to colonise the river). There are measures to permanently improve fish habitats within diverted river sections of up to 1 km. In particular, there are likely to be significant but localised beneficial effects associated with the diversions and removal of culverts from the Washwood Heath Brook and the diversion of the River Tame at Park Hall Nature Reserve. The overall effect on this element is likely to be minor beneficial provided that benefits from scheme elements (diversions) are maximised.		Measures to improve fish habitat or mitigate any adverse effects form part of the embedded mitigation measures described previously, therefore no additional measures are required. These include channel habitat improvements on the diverted sections of River Tame, Washwood Heath Brook, Dunlop Channel and other minor tributaries. **The detailed design for the river diversions should be undertaken in consultation with the EA in order to ensure that these potential beneficial effects are maximised.**		
	Physico-Chemical status									
WFD classification elements	**5. Dissolved Oxygen**	High	-	**Predicted change to status elements (green = none, amber = possibly, red = likely)**	No significant effects on upstream watercourses (River Rea, Plants Brook) anticipated.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	No additional mitigation required	No additional mitigation required	No significant effects	-
	6. pH	High	-		No significant effects on upstream watercourses (River Rea, Plants Brook) anticipated.					
	7. Phosphate	Bad	-		No significant effects on upstream watercourses (River Rea, Plants Brook) anticipated.					
	8. Ammonia	Poor	-		No significant effects on upstream watercourses (River Rea, Plants Brook) anticipated.					
	9. Temperature	-	-		No significant effects on upstream watercourses (River Rea, Plants Brook) anticipated.					
	10. Specific Pollutants (Annex VIII)	High	-		No significant effects on upstream watercourses (River Rea, Plants Brook) anticipated.					
	Hydromorphological status									**Hydromorphology Baseline**
WFD classification elements	**11. Quantity and dynamics of river flow**	-	-	**Predicted change to status elements (green = none, amber = possibly, red = likely)**	No significant effects on upstream watercourses (River Rea, Plants Brook) anticipated.	• The existing watercourse is heavily modified and deteriorated from natural conditions • The proposed realignment would still have an unnatural channel form (e.g. it is very straight) but it appears to be defined by space constraints • Overall, the plan to realign the channel is considered to be beneficial, if the development opportunity is be used to implement some naturalisation of channel form and process	Undertake hydromorphological surveys to aid detailed design Incorporate hydromorphological measures into detailed design where practicable. Mitigation measures may include: • Bank reprofiling (rehabilitation) • Create low flow channels in over-widened/over-deepened channels • Create reed fringes • Creation of shallow margin in front of hard defence • Create reed fringes • Introduce riparian vegetation/green corridors where space allows • Recreate a sinuous river channel (re-meandering) where space allows • Recreation of gravel bars and riffles using permanent and/or temporary bed structures (increase morphological diversity) • Retain substrate bed through culvert where possible • Use of engineering techniques to assist natural recovery • Use soft engineering techniques	Minor beneficial effects possible	• Channel is heavily modified for flood risk and urbanisation and is realigned (straightened) and probably deepened with hard engineering • Channel would naturally be sinuous, but planform morphology would probably be quite stable. This is shown by the non-straightened reach ca. 1 km downstream of the viaduct crossing location where an administrative boundary (which is likely to have been established for decades) follows the channel centre line. • Map from the mid 1900s show this section has not changed significantly for at least ca. 10 years. • Some palaeo features can be observed from aerial images in floodplain areas, which are indicative of channel meandering prior to straightening • Channel straightening has probably resulted in increased gradient and flow velocity. • Channel form, boundary conditions and therefore flow patterns are probably homogenised at present.
	12. Connection to Groundwater	-	-		No significant effects on upstream watercourses (River Rea, Plants Brook) anticipated.					
	13. River continuity	-	-		No significant effects on upstream watercourses (River Rea, Plants Brook) anticipated.					• No structures visible in channel in the vicinity of the site • Riparian zones and floodplains appear to absent to the north in realigned reach due to the railway line, but Park hall Nature Reserve is green space to the south • Bank habitat continuity severed by hard engineering for realignment • Extensive straightening would mean accelerated and homogenised flow, so fish migration may be difficult, especially with no channel diversity or rest areas
	14. River depth and width variation bed	-	-		No significant effects on upstream watercourses (River Rea, Plants Brook) anticipated.					• Natural channel width seems to be maintained despite realignment • Straightened and homogenised channel means there is probably little depth variation in the realigned reaches, i.e. no pool - riffle sequence, as would be expected in sinuous channel
	15. Structure and substrate of river bed	-	-		No significant effects on upstream watercourses (River Rea, Plants Brook) anticipated.					• Low, medium, calcareous RBMP channel type • Developed in alluvium (clay, silt, sand, gravel) over Mercia Mudstone. No faults mapped at the site that would suggest an influence on channel form • Channel sediments likely to be fines within a gravel matrix. Probably excess fines due to heavy urbanised catchment and disconnection of floodplains • Natural substrates could have been scoured out by effects of straightening • Bed substrates likely to be thin and dominated by sands and silts rather than gravels. Urbanisation upstream almost certainly includes weirs and flow controls so there may be reduced delivery of relatively large substrates to this site, and depletion of bed gravels. Channel straightening will probably have increased gradient and flow velocities, so much of the non-straightened reach is a zone sediment deposition as a result of locally reduced bed gradient as hard engineering for realignments are removed. By inference, historic straightening and increased gradient and flow velocities in the realignment reach probably mean less sediment is deposited, so the sediment regime is disturbed at wider scale
	16. Structure of riparian zone	-	-		No significant effects on upstream watercourses (River Rea, Plants Brook) anticipated.					• Whole catchment is heavily urbanised, with development frequently extending to the bank tops • Channel boundary appears to be irregular, i.e. banks not perfectly straight as they were probably engineered, suggesting channel it is trying to restore its natural sinuosity • The rate of bank erosion and change in channel planform since straightening must be very slow, in the order of mm per year

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	**Where RBMP measure will happen**	**When RBMP measure will happen**							
Educate landowners on sensitive management practices (urbanisation)	In Place	-	**May prevent implementation of RBMP measure (green = No risk, amber = possible risk, red = likely risk)**	-	N/A	N/A	N/A		-
Ensure that the thermal regime in waters downstream of the impounding works is consistent with good status conditions	In Place	-		-	No effect on implementation of this measure	No additional mitigation required	No additional mitigation required		
Ensure that good status of dissolved oxygen levels is being achieved downstream of the impounding works	In Place	-		-	In river engineering works will be designed to minimise sediment releases which could result in lowering of DO. Any effects with thus be minor and temporary and will not affect implementation of measure	No additional mitigation required	No additional mitigation required		
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	In Place	-		-	The proposed scheme is likely to modify the banks of the River Tame in a way that will make them less steep. Therefore, it is considered that the diversion of the Tame in the medium to long term is not likely to compromise the achievement of this measure and may contribute locally to meeting this objective.	No additional mitigation required	No additional mitigation required		
Increase in-channel morphological diversity	In Place	-		-	The design of the river diversions will include in channel and marginal habitats thus contributing to this measure within diverted sections River Tame	No additional mitigation required	No additional mitigation required		
Removal of hard bank reinforcement / revetment, or replacement with soft engineering solution	In Place	-		-	There will be increases in hard bank reinforcements at the viaduct location. Soft engineering solutions will be used where possible in the river diversions	No additional mitigation required	No additional mitigation required		-
Ensure there is an appropriate baseline flow regime downstream of the impoundment.	Not in place	-		-	N/A	N/A	N/A		
Operational and structural changes to locks, sluices, weirs, beach control, etc.	Not in place	-		-	N/A	N/A	N/A		
Structures or other mechanisms in place and managed to enable fish to access waters upstream and downstream of the impounding	Not in place	-		-	No effect on implementation of this measure	No additional mitigation required	No additional mitigation required		
Preserve and, where possible, restore historic aquatic habitats	Not in place	-		-	The proposed new channel of the River Tame is likely to provide a wider range of habitat than the existing channel, notably for macroinvertebrates and fish. In addition, wetlands areas are going to be created as part of the scheme north of the river Tame. Therefore, it will be considered that the diversion of 1 km of the River Tame will not comprise the implementation of this measure, and could locally contribute to it.	No additional mitigation required	No additional mitigation required		
Re-engineering of the river where the flow regime cannot be modified.	Not in place	-		-	The scheme will restrict the implementation of this measure in those sections where the HS2 crosses the river, and within the river diversions.	No additional mitigation required	No additional mitigation required		

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Note: water body not directly crossed by scheme, but downstream of several WFD that are impacted

	Surface Water body	Current status	Status objective	Scheme Elements	Impacts from other WFD water bodies (River Blythe, upstream sections of River Tame, River Cole, Langley Brook, Black-Bourne Brook)	OVERALL impact on element	
	GB104028046440	Poor	Good by 2027	Description of scheme element impact			
	River Tame from River Blythe to River Anker			Identified biological impacts			
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	Poor	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	- No indirect effects on water body anticipated brought about by impacts to upstream water bodies (see relevant spread sheets)	- Provided mitigation measures on upstream water bodies are implemented as recommended (see relevant spread sheets), there will be no effect on current or future status of biological elements of the River Tame from R Blythe to R Anker watercourse	-
	2. Macrophytes and phytobenthos - macrophytes	-	-				
	3. Macroinvertebrates	Poor	-				
	4. Fish	Poor	-		- Possible effects on the fish element identified for Langley Brook and River Blythe (potential barriers to migration), which has a low risk of secondary effects on migratory fish on River Tame from R Blythe to Anker water body - Mitigation measures proposed (see relevant spread sheets), if implemented, will result in no residual effect on the fish element on any of these water bodies - It is therefore deemed that there will be no impact on the fish element of the River Tame from R Blythe to R Anker water body		
	Physico-Chemical status						
WFD classification elements	5. Dissolved Oxygen	Good	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	-
	6. pH	High	-				
	7. Phosphate	Bad	-				
	8. Ammonia	Poor	-				
	9. Temperature	-	-				
	10. Specific Pollutants (Annex VIII)	High	-				
	Hydromorphological status						**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	• Given the degree of hydromorphological impacts at water body scale upstream, it is highly unlikely that hydromorphological effects would cascade to connecting water bodies, especially if mitigation measures are put in place 'at source'.	• Given the degree of hydromorphological impacts at water body scale upstream, it is highly unlikely that hydromorphological effects would cascade to connecting water bodies, especially if mitigation measures are put in place 'at source'.	Not applicable
	12. Connection to Groundwater	-	-				
	13. River continuity	-	-				
	14. River depth and width variation bed	-	-				
	15. Structure and substrate of river bed	-	-				
	16. Structure of riparian zone	-	-				

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen				
NOT REQUIRED FOR THE ASSESSMENT OF THIS WATER BODY	n/a	n/a	Predicted change to status elements (green = none, amber = possibly, red = likely)	n/a	n/a	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	River Diversion			Culvert					Impacts from other WFD water bodies (assessed separately)	OVERALL impact on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
	GB104028046860	Moderate	Good by 2027	Description of scheme element impact	Plants Brook extension (70 m) for reconnection to the diverted River Tame channel, design details not available			Plants Brook underbridge (27 m long, 18 m wide, 4.4 m high)							Construction	Operation		
	Plants Brook catchment (tributary of Tame)			Identified biological impacts	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage						
WFD classification elements	1. Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status: elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	-	-		Possible temporary disturbance of habitat on the Plants Brook during construction. The watercourse is heavily shaded by riparian vegetation in the stretch impacted and currently supports very low aquatic vegetation (ecology baseline surveys). Effect likely to be minor and highly localised	The new channels will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. Local effect likely to be beneficial.	No significant hydromorphological changes expected. No likely effect anticipated	Receptor not sensitive to impact	Likely to lead to a localised but permanent loss of habitat. The watercourse is heavily shaded by riparian vegetation in the stretch impacted and currently supports very low aquatic vegetation (ecology baseline surveys). Effects on macrophytes likely to be negligible.	Likely to lead to localised but permanent loss of macrophytes, by reduction of photosynthetic activity. The watercourse is heavily shaded by riparian vegetation in the stretch impacted and currently supports very low aquatic vegetation (ecology baseline surveys). Effects on macrophytes likely to be negligible.	No significant hydromorphological changes expected. No likely effect anticipated	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	No upstream water body	The river extension is likely to have a temporary adverse effect during construction of the new channel. This should be balanced by the creation of 70 m of new habitat. Habitat extension likely to lead to a beneficial overall locally if proposed mitigation measures are implemented.	Other than implementation of relevant Environment Agency Pollution Prevention Guidelines (PPG) during construction, no other mitigation measures are required.	None required.	Minor beneficial effects possible	-
	3. Macroinvertebrates	Good	Good		Possible temporary disturbance of habitat on the Plants Brook during construction. The watercourse currently supports moderately good macroinvertebrate quality (ecology baseline surveys). Effect likely to be minor and highly localised, with no effect on the status of this element	The river diversions will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach. Localised effect on macroinvertebrates likely to be beneficial.	No significant hydromorphological changes expected. No likely effect anticipated	Receptor not sensitive to impact	Likely to lead to a localised but permanent loss of habitat (i.e. streambed, riparian vegetation). The watercourse currently supports moderately good macroinvertebrate quality (ecology baseline surveys). Effect likely to be minor and highly localised, with no effect on the element status at the scale of the water body.	No additional effect anticipated (loss of habitat already considered in the landtake impact).	No significant hydromorphological changes expected. No likely effect anticipated	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	No upstream water body	The two scheme elements are identified as having the potential to have an adverse effect on macroinvertebrates. However, adverse effects are likely to very localised (culvert) and/or temporary (river diversion) and would be balance by the creation of 70 m of new macroinvertebrate habitats .The overall effect of the scheme is therefore likely to be neutral at the scale of the water body and would not lead to the deterioration of the current WFD macroinvertebrates status (Good) at the scale of the water body.	Other than implementation of relevant Environment Agency Pollution Prevention Guidelines (PPG) during construction, no other mitigation measures are required.	None required.	No significant effects	-
	4. Fish	-	-		Possible temporary disturbance of habitat on the Plants Brook during construction. No data available on fish for Plants Brook. By default, localised and temporary adverse effect.	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities. No data on fish is available for these watercourses. Locally beneficial effect anticipated.	No significant hydromorphological changes expected. No likely effect anticipated	No data available on fish for Plants Brook. By default, localised and temporary adverse effect during construction.	Likely to lead to a localised but permanent loss of habitat. No data available on fish for Plants Brook. By default, localised and temporary adverse effect.	No additional effect anticipated (loss of habitat already considered in the landtake impact).	No significant hydromorphological changes expected. No likely effect anticipated	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	No upstream water body	The two scheme elements are identified as having the potential to have a temporary and/or very localised adverse effect on fish. However, these adverse effects would be balanced by the creation of 70 m of new habitats available to fish. If the culvert is designed and maintained to allow for fish passage, long term effect likely to be neutral.	Other than implementation of relevant Environment Agency Pollution Prevention Guidelines (PPG) during construction, no other mitigation measures are required.	None required.	No significant effects	-
	Physico-Chemical status																	
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The existing habitat is of poor quality. In practical terms there would be no change in status.	N/A	N/A	As much of the watercourse is already culverted, there is likely to be a negligible impact on dissolved oxygen. This impact is likely to have a negligible effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	No upstream water body	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and attenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	No significant effects	-
	6. pH	Moderate	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No upstream water body					
	7. Phosphate	High	-		N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	No upstream water body					
	8. Ammonia	High	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No upstream water body					
	9. Temperature	-	-		N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	As much of the watercourse is already culverted, there is likely to be a negligible impact on temperature. This impact is likely to have a negligible effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	No upstream water body					
	10. Specific Pollutants (Annex VIII)	High	-		N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	No upstream water body					
	Hydromorphological status																	**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• Channel width appears to be 2m or less, and historic straightening in this reach and straightening and culverting upstream mean there is unlikely to be significant diversity of flow dynamics • It is possible that discharge from Plants Brook is regulated for the benefit of flood risk in the River Tame • Extending around a balancing pond may reduce flow rates as a result of channel lengthening, although the diversion is not far from the existing channel course • In practical terms the impacts on flow dynamics would not be measurable and are not considered significant	N/A	N/A	N/A	• Channel width appears to be 2m or less, and historic straightening in this reach and straightening and culverting upstream mean there is unlikely to be significant diversity of flow dynamics • Out of bank flows are likely to be regulated according to upstream culvert dimensions, and relocating the culvert would not have any negative effects relative to existing conditions • It is possible that discharge from Plants Brook is regulated for the benefit of flood risk in the River Tame	N/A	No upstream water body	• The whole water body is heavily modified and there is only a short reach of open watercourse at this location. Realistically, a short channel extension and relocation of an existing culvert would have little overall impact. There is also little room for improvement, but mitigation measures could be implemented to improve morphological diversity at a very local scale	None required.	None required.	No significant effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	No upstream water body					
	13. River continuity	-	-		N/A	N/A	• Previous channel modifications mean there would be no impact on (poor) channel continuity	N/A	N/A	N/A	• Culverts disconnect floodplains and out-of-bank flows, and bank and riparian habitats and can effectively sever flow, sediment, and habitat continuity • However, relocating an existing culvert in a HMWB would not impact on deterioration of existing conditions	N/A	No upstream water body					
	14. River depth and width variation bed	-	-		N/A	N/A	• The diversion extension would replicate existing channel geometry. Flow depths may decrease marginally as a result of lengthening the channel, but in practical terms there would be no significant change	N/A	N/A	N/A	• Out-of bank flows may be constrained by the culvert, but there would be no change from existing conditions	N/A	No upstream water body					
	15. Structure and substrate of river bed	-	-		N/A	N/A	• Existing modifications probably mean bed conditions are heavily deteriorated, and although lengthening a channel tend to reduce flow rates and increase deposition of sediment and associated contaminants, given historic modifications to this watercourse there would be no measurable impact	N/A	N/A	N/A	• Existing modifications probably mean bed conditions are heavily deteriorated, and relocating the culvert would not have any impact • If the culvert base is set below the channel bed, the impacts on the bed could be minimised, but this may not be possible if discharge from Plants Brook is regulated for the benefit of flood risk mitigation in the River Tame	N/A	No upstream water body					
	16. Structure of riparian zone	-	-		N/A	N/A	• The channel has limited riparian zones of rough vegetation. Lengthening the channel would increase riparian habitat extents, but the existing habitat is of poor quality. In practical terms there would be no change	N/A	N/A	N/A	• Culverts disconnect the channel from banks, riparian zones and floodplains, but relocating the existing culvert would mean there is no change from existing conditions	N/A	No upstream water body					

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen															
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	Not in place	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	The creation of 70 m of new habitat as part of the reconnection of Plants Brook to the River Tame unlikely to compromise and likely to participate very locally to the implementation of the mitigation measure. No deterioration of the current Moderate WFD status and no effect on the achievement of Good WFD status objectives of the Mitigation Measures expected.	No further mitigation measures than those included within the current design appear necessary	No further mitigation measures than those included within the current design appear necessary	No significant effects	-
Structures or other mechanisms in place and managed to enable fish to access waters upstream and downstream of the impounding works.	Not in place	-		-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-	-	If the culvert is properly designed and installed to allow fish passage, the scheme is unlikely to compromise and likely to participate very locally to the implementation of the mitigation measure. No deterioration of the current Moderate WFD status and no effect on the achievement of Good WFD status objectives of the Mitigation Measures expected.				
Increase in-channel morphological diversity	Not in place	-		-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	The creation of 70 m of new habitat as part of the reconnection of Plants Brook to the River Tame unlikely to compromise and likely to participate very locally to the implementation of the mitigation measure. No deterioration of the current Moderate WFD status and no effect on the achievement of Good WFD status objectives of the Mitigation Measures expected.				
Preserve and, where possible, restore historic aquatic habitats	Not in place	-		-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	The creation of 70 m of new habitat as part of the reconnection of Plants Brook to the River Tame unlikely to compromise the implementation of the mitigation measure. No deterioration of the current Moderate WFD status and no effect on the achievement of Good WFD status objectives of the Mitigation Measures expected.				
Removal of hard bank reinforcement / revetment, or replacement with soft engineering solution	Not in place	-		-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	-	• Nature of impact means that these measures could be achieved locally as a result of the scheme, which will contribute to achieving future objectives at water body scale	-	-	The creation of 70 m of new habitat as part of the reconnection of Plants Brook to the River Tame unlikely to compromise and likely to participate very locally to the implementation of the mitigation measure. No deterioration of the current Moderate WFD status and no effect on the achievement of Good WFD status objectives of the Mitigation Measures expected.				

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Viaduct (footings in or within riparian zone of watercourse)					River Diversion - River Rea overflow channel			Impacts from other WFD water bodies (assessed separately)	OVERALL impact on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
	GB104028042550			Description of scheme element impact	*Curzon Street Viaduct No.1. Approximately 700m long viaduct, average 17m above ground level. Crosses River Rea once, but is unaffected by design.*					*The watercourse will be diverted to the east side of the A47 junction. A new culvert will pass beneath A 47 Heartlands Parkway and beneath the existing Watson Road turning head, joining to the existing culvert.*					Construction	Operation		
	River Rea from Bourn Brook to River Tame	Moderate	Good Ecological Potential by 2027	Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	Not assessed	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	Not assessed	-		- Receptor is insensitive to impact	- Baseline field surveys indicate that macrophytes are of limited diversity and abundance in this area of the River Rea, where the channel is canalised - Given the small footprint of the bridge footings and limited macrophyte diversity within the channel, any impacts on macrophytes due to landtake will be minor and localised, with no effect on the quality of this element at the water body level	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - Macrophyte diversity and abundance are low and there would only be a localised and minor effects on macrophyte communities - Any effects are likely to be minor or negligible and highly localised with no change in status of this quality element.	- Change to channel hydraulics will result in localised increase in flow velocity downstream of crossing and lead to scouring of habitat in vicinity. However, this would be highly localised and minor and not further degrade status in the medium to long term. Therefore there would only be a minor and localised/temporary impact.	No anticipated change in water quality	- Likely short term habitat loss while new channel establishes, but no long term impact as habitat will be replaced (see 'creation of new habitats')	The new channels will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. Local effect likely to be beneficial.	No significant hydromorphological changes expected. No likely effect anticipated	No anticipated impacts from other water bodies	- Macrophytes are not currently monitored in the River Rea and don't have a status. - Although baseline data are limited, data available show that within the stretch affected, the River Rea is within a highly urbanised area and is a heavily modified (canalised) channel with apparently limited macrophyte diversity - Although the scheme will lead to loss of habitat (due to footings in the watercourse) and photosynthetic activity (in shaded areas) the scheme includes several opportunities for improved macrophyte habitats, notably in marginal areas of diverted sections. The overall effect on this element is likely to be neutral or have a minor beneficial effect, if benefits from the scheme are maximised.	None required.	None required.	Minor and localised effects	-
	3. Macroinvertebrates	Not assessed	-		- Receptor is insensitive to impact	- Landtake will reduce the habitats available for colonisation within directly affected area. - Although no invertebrate data are available given the physicochemical status of the River Rea and the fact it is a highly modified (canalised) channel, the invertebrate community is not likely to be highly sensitive to impacts. - Effect likely to be minor or negligible and highly localised with no overall effect on the status of this element.	- Any changes in macrophytes will be highly localised and minor, with no measurable indirect effect on macroinvertebrates	- Change to channel hydraulics will result in localised increase in flow velocity downstream of crossing and lead to scouring of habitat in vicinity. However, due to poor invertebrate baseline, this would not further degrade status in the medium to long term. Therefore there would only be a minor and localised/temporary impact.	No anticipated change in water quality	- Likely short term habitat loss while new channel establishes, but no long term impact as habitat will be replaced (see 'creation of new habitats')	The river diversions will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach. . Localised effect on macroinvertebrates likely to be beneficial.	No significant hydromorphological changes expected. No likely effect anticipated	No anticipated impacts from other water bodies	- Macroinvertebrates are not currently monitored in the River Rea and don't have a status. - No baseline macroinvertebrate data were available but within the stretch affected, the River Rea is in a highly urbanised catchment and is a heavily modified (canalised) channel with poor to moderate water quality. It therefore not likely to support a diverse community of macroinvertebrates, high biotic scores or sensitive species. - Although the scheme will lead to loss of habitat (due to footings in the watercourse), the scheme includes several opportunities for improved habitats, notably in marginal areas of diverted sections. The overall effect on this element is likely to be neutral or have a minor beneficial effect, if benefits from the scheme are maximised.	None required.	None required.	Minor and localised effects	-
	4. Fish	Not assessed	-		- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). - Any effects will be temporary and localised.	- Landtake will reduce the habitats available for colonisation within directly affected area. - Although no fish data are available because the physicochemical status of the River Rea and the fact it is a highly modified (canalised) channel, the fish are not likely to be highly sensitive to impacts. - Effect likely to be minor or negligible and highly localised with no overall effect on the status of this element.	- Any changes in macrophytes will be highly localised and minor, with no measurable indirect effect on fish	- Change to channel hydraulics will result in localised increase in flow velocity downstream of crossing and lead to scouring of habitat in vicinity. However, this would be highly localised and minor and the fish community are not highly sensitive so it would not further degrade status in the medium to long term. Therefore there would only be a minor and localised/temporary impact.	No anticipated change in water quality	- Likely short term habitat loss while new channel establishes, but no long term impact as habitat will be replaced (see 'creation of new habitats')	The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities. No data on fish is available for these watercourses. Locally beneficial effect anticipated.	No significant hydromorphological changes expected. No likely effect anticipated	No anticipated impacts from other water bodies	- Fish are not currently monitored in the River Rea and do not have a status. - No baseline fish data were available, but within the stretch affected, the River Rea is in a highly urbanised area and is a heavily modified (canalised) channel with poor to moderate water quality, and therefore not likely to support high fish diversity/abundances or sensitive species - Although the scheme will lead to loss of habitat (due to footings in the watercourse), the scheme includes several opportunities for improved habitats, notably in marginal areas of diverted sections. The overall effect on this element is likely to be neutral or have a minor beneficial effect, if benefits from the scheme are maximised.	None required.	None required.	Minor and localised effects	-
	Physico-Chemical status																	
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • Realistically, the effects of urbanisation in the rest of the catchment and the space available for habitat betterment mean that there are unlikely to be significant benefits to dissolved oxygen levels	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	No anticipated impacts from other water bodies	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	No significant effects	-
	6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No anticipated impacts from other water bodies					
	7. Phosphate	Good	-		N/A	N/A	N/A	n is effectively an open span bridge, so there would be no impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change	No anticipated impacts from other water bodies					
	8. Ammonia	Moderate	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No anticipated impacts from other water bodies					
	9. Temperature		-		N/A	N/A	Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No anticipated impacts from other water bodies					
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	No anticipated impacts from other water bodies					
	Hydromorphological status																	**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• Footings in the riparian zone (none are proposed on the watercourse) would have no effect. The channel is very a very homogenised city centre HMWB, and effectively has no riparian zones	N/A	N/A	N/A	• Whilst there are opportunities to re-naturalise flow dynamics and create a habitat island in the city centre, realistically, the effects of urbanisation in the rest of the catchment and the space available for habitat betterment mean that there are unlikely to be significant benefits to flow dynamics. Equally, the effects of historic modification mean there would be no deterioration.	No anticipated impacts from other water bodies	• Whilst there are opportunities to re-naturalise flow dynamics and create a habitat island in the city centre, realistically, the effects of urbanisation in the rest of the catchment and the space available for habitat betterment mean that there are unlikely to be significant benefits to flow dynamics. Equally, the effects of historic modification mean there would be no deterioration.	None required.	None required.	No significant effects	• Channel is heavily modified for flood risk and urbanisation and is realigned (straightened) and probably deepened with hard engineering • Historic maps show that channel planform has not changed in the order of centuries. • Some palaeo features can be observed from aerial images in floodplain areas, which are indicative of channel meandering prior to straightening • Channel straightening has probably resulted in increased gradient and flow velocity. • Channel form, boundary conditions and therefore flow patterns are probably homogenised at present.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	• Not significant to hydromorphology	N/A	N/A	N/A		No anticipated impacts from other water bodies		None required.	None required.		• Not significant to hydromorphology
	13. River continuity	-	-		N/A	N/A	N/A	• Footings in the watercourse or riparian zones would decrease continuity by the presence of physical obstacles and locally increased flow velocity and turbulence	N/A	N/A	N/A		No anticipated impacts from other water bodies		None required.	None required.		• No structures visible in channel in the vicinity of the site • Riparian zones and natural floodplains are effectively absent • Bank habitat continuity is severed by hard engineering for realignment • Extensive straightening would mean accelerated and homogenised flow, so fish migration may be difficult, especially with no channel diversity or rest areas
	14. River depth and width variation bed	-	-		N/A	N/A	N/A	• The channel is a city centre HMWB and is effectively a concrete box. As such there would be no deterioration to existing conditions	N/A	N/A	N/A		No anticipated impacts from other water bodies		None required.	None required.		• Channel is overwide and overdeep for flood risk mitigation • Straightened and homogenised channel means there is probably little variation
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• The channel is a city centre HMWB and is effectively a concrete box. As such there would be no deterioration to existing conditions	N/A	N/A	N/A		No anticipated impacts from other water bodies		None required.	None required.		• Natural substrates could have been scoured out by effects of straightening • Bed substrates likely to be thin and dominated by sands and silts rather than gravels. Urbanisation upstream almost certainly includes weirs and flow controls so there may be reduced delivery of relatively large substrates to this site, and depletion of bed gravels • Sediment deposits likely to be contaminated
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	• The channel is a city centre HMWB and is effectively a concrete box. As such there would be no deterioration to existing conditions	N/A	N/A	N/A		No anticipated impacts from other water bodies		None required.	None required.		• Whole catchment is heavily urbanised, with development frequently extending to the bank tops, so there effectively is no riparian zone

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen															
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	• Measures are likely to become more difficult to implement at the crossing location • Development opportunity should be used to implement measures elsewhere. If this takes place future status will not be inhibited and it will help objectives to be achieved • Given very heavily modified nature of the water body, this should be viewed as an opportunity and an advantage	-	-	-	• Development opportunity should be used to implement measures. If this takes place future status will not be inhibited and it will help objectives to be achieved • Given very heavily modified nature of the water body, this should be viewed as an opportunity and an advantage	N/A	• Measures are likely to become more difficult to implement at the crossing location • Development opportunity should be used to implement measures elsewhere. If this takes place future status will not be inhibited and it will help objectives to be achieved • Given very heavily modified nature of the water body, this should be viewed as an opportunity and an advantage	-	-	Minor beneficial effects possible	-
Increase in-channel morphological diversity	-	-		-	-	-		-	-	-		N/A		-	-		
Removal of hard bank reinforcement / revetment, or replacement with soft engineering solution	-	-		-	-	-		-	-	-		N/A		-	-		

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Viaduct - Curzon Street Viaduct No.3 (footings in or within riparian zone of watercourse)					Saltley Viaduct and overbridge - Rebuild of previous overbridge over canal at Saltley (Underbridge) and B4114 Road Overbridge.					Birmingham and Fazeley Canal No.2 Viaduct.					River Diversion - Tributary Feeder to Birmingham and Fazeley Canal at Cuttle Mill Fishery		
GB70410515	Good	Good Ecological Potential by 2027	Description of scheme element impact	*Viaduct crossing Birmingham and Fazeley Canal Upper Section at SWC-CFA26-004.*					*Rebuild of existing overbridge at Grand Union Canal Saltley Overbridge (SWC-CFA26-002) and Saltley Viaduct road overbridge over Canal.*					*Construction of 230m viaduct over Birmingham and Fazeley Canal at (SWC-CFA20-044).*					*In channel works on Tributary Feeder to Birmingham and Fazeley Canal at Cuttle Mill Fishery (CFA20-SWC-047). Scour protection works along with channel bed reprofiling and vegetation and debris clearing at North Wood embankment.*		
Birmingham and Fazeley Canal upper section			Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream
WFD classification elements	1.Macrophytes and phytobenthos - diatoms																				
	2. Macrophytes and phytobenthos - macrophytes	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	- Receptor is insensitive to impact.	No footings in watercourse.	- Baseline surveys indicate abundant channel macrophyte communities in the area. - There may be minor changes in the cover and composition of macrophyte communities, but this is not considered to be greater than a minor localised change.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	Receptor is insensitive to impact.	No footings in watercourse.	- Baseline surveys indicate abundant low macrophyte cover. - There may be minor changes in the cover and composition of macrophyte communities, but this is not considered to be greater than a minor localised change.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- Receptor is insensitive to impact.	No footings in watercourse.	- Baseline surveys indicate abundant channel macrophyte communities in the area. - There may be minor changes in the cover and composition of macrophyte communities, but this is not considered to be greater than a minor localised change.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- There will be loss of marginal and channel macrophytes over the length of the existing watercourse that lies within the diverted section. - No baseline data are available, but the macrophyte community will re-establish within 1 to 2 years of completion of the river diversion. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised	- The new channel will replicate existing habitat and where possible incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. - Embedded mitigation to include retaining and if possible enhancing the overall quality of the watercourses, for example by including meanders and enhanced banks. - Improvements along watercourse either side of culvert, sufficient to maintain open length and watercourse gradient. NOTE THEIR IS A COMMENT IN CHAPTER 2 AS TO WHETHER THIS IS ACHEIVABLE -The effect on this quality element is considered to be minor positive.	- No hydromorphological effects anticipated and therefore no effect on macrophyte communities
	3. Macroinvertebrates	-	-		- Receptor is insensitive to impact.	No footings in watercourse.	- Macroinvertebrate community may be slightly altered due to shading effects on macrophyte communities (which form a significant component of invertebrate habitat in this area, following baseline survey data), but this is considered to be localised and minor. .	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	Receptor is insensitive to impact.	No footings in watercourse.	- Macroinvertebrate community may be slightly altered due to shading effects on macrophyte communities (which form a significant component of invertebrate habitat in this area, following baseline survey data), but this is considered to be localised and minor.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	Receptor is insensitive to impact.	No footings in watercourse.	- Macroinvertebrate community may be slightly altered due to shading effects on macrophyte communities (which form a significant component of invertebrate habitat in this area, following baseline survey data), but this is considered to be localised and minor.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- There will be temporary loss of macroinvertebrates and habitat over the length of the existing watercourse that lies within the diverted section. - No baseline data available but community likely to require less than 1 year to re-establish give the short distance affected. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised	- The river diversion will replicate existing habitat and where possible will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach. - Embedded mitigation to include retaining and if possible enhancing the overall quality of the watercourses, for example by including meanders and enhanced banks. - Improvements along watercourse either side of culvert, sufficient to maintain open length and watercourse gradient. NOTE THEIR IS A COMMENT IN CHAPTER 2 AS TO WHETHER THIS IS ACHEIVABLE	- No hydromorphological effects anticipated and therefore no effect on macroinvertebrate communities
	4. Fish	-	-		- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). There were no baseline fish surveys. - Effects are likely to be temporary and localised.	No footings in watercourse.	- Possible minor and localised effects on fish, as macrophyte communities are rich and abundant in the area and are likely to provide locally important habitats for fish	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). There were no baseline fish surveys. - Effects are likely to be temporary and localised.	No footings in watercourse.	- No likely effects on fish.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). There were no baseline fish surveys. - Effects are likely to be temporary and localised.	No footings in watercourse.	- Possible minor and localised effects on fish, as macrophyte communities are rich and abundant in the area and are likely to provide locally important habitats for fish.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- There will be temporary loss of fish habitat over the length of the existing watercourse that lies within the diverted section. - No fish data available, but it is likely to require less than 1 year to re-establish give the short distance affected. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised	- The river diversion will replicate existing habitat and where possible be designed to include a range of habitats that are suitable for the fish species present The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities. - Embedded mitigation to include retaining and if possible enhancing the overall quality of the watercourses, for example by including meanders and enhanced banks. - Improvements along watercourse either side of culvert, sufficient to maintain open length and watercourse gradient. NOTE THEIR IS A COMMENT IN CHAPTER 2 AS TO WHETHER THIS IS ACHEIVABLE	- No hydromorphological effects anticipated and therefore no effect on fish communities
Physico-Chemical status																					
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor beneficial with no degradation of current status anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.
	6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact
	7. Phosphate	High	-		N/A	N/A	N/A	ectively an open span bridge, so there would be no	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	N/A	N/A	ectively an open span bridge, so there would be no	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	N/A	N/A	Rectively an open span bridge, so there would be no	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to timescale and the water body. Therefore, no change in status is anticipated.
	8. Ammonia	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact
	9. Temperature	-	-		N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
Hydromorphological status																					
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)			N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.				N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.				N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.		N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.
	12. Connection to Groundwater	-	-				N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.				N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.				N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.		N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.
	13. River continuity	-	-				N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.				N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.				N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.		N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.
	14. River depth and width variation bed	-	-				N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.				N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.				N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.		N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.
	15. Structure and substrate of river bed	-	-				N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.				N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.				N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.		N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.
	16. Structure of riparian zone	-	-				N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.				N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.				N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.		N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen																			
Manage disturbance	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone.	-	-		Some loss of bankside habitat due to construction of viaduct					Some loss of bankside habitat due to construction of viaduct					Some loss of bankside habitat due to construction of viaduct					Embedded mitigation measures will enhance ecological value of habitat		
Avoid the need to dredge (e.g. minimise under-keel clearance; use fluid mud navegation; flow manipulation or training works)	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Prepare a dredging / disposal strategy	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Reduce impact of dredging	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Reduce sediment resuspension	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alter timing of dredging / disposal	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bank rehabilitation / reprofiling	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Site selection (dredged material disposal) (e.g. avoid sensitive sites)	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Awareness raising / information boards (boat wash / sources of fine sediment)	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phased de-watering and other techniques	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selective vegetation control regime	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Appropriate vegetation control technique	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Appropriate timing (vegetation control)	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Appropriate techniques (invasive species)	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Modify vessel design	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vessel Management	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sediment management	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	River Diversion - Tributary Feeder to Birmingham and Fazeley Canal at Middleton House Farm.			Culvert - North Wood Underbridge on Tributary feeder to Birmingham and Fazeley Canal at Middle House Farm					Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB70410515	Good	Good Ecological Potential by 2027	Description of scheme element impact	*In channel works on Tributary Feeder to Birmingham and Fazeley Canal at Middleton House Farm (CFA20-SWC-048). Scour protection works along with channel bed reprofiling and vegetation and debris clearing at North Wood embankment and Mill Pool embankment.*			*North Wood underbridge at North Wood embankment (CFA20-SWC-049). Scour protection works on watercourse and construction of North Wood underbridge which is noted as a culvert.*							Construction	Operation		
Birmingham and Fazeley Canal upper section			Identified biological impacts	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms																
	2. Macrophytes and phytobenthos - macrophytes	-	-	-There will be loss of marginal and channel macrophytes over the length of the existing watercourse that lies within the diverted section. - No baseline data are available, but the macrophyte community will re-establish within 1 to 2 years of completion of the river diversion. - There is also the potential for impacts during construction (e.g., release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised.	- The new channel will replicate existing habitat and where possible incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. - Embedded mitigation to include retaining and if possible enhancing the overall quality of the watercourses, for example by including meanders and enhanced banks. - Improvements along watercourse either side of culvert, sufficient to maintain open length and watercourse gradient. NOTE THEIR IS A COMMENT IN CHAPTER 2 AS TO WHETHER THIS IS ACHEIVABLE. -The effect on this quality element is considered to be minor positive.	- No hydromorphological effects anticipated and therefore no effect on macrophyte communities	- Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - No baseline data available, but this is a small trib that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Shading of the channel from the structure has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - No baseline data available, but this is a small drain that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the extended culvert) may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). - No baseline data available, but this is a small trib. that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	None identified	- Only minor and localised effects anticipated, when considered separately or cumulatively	No additional mitigation measures required.	No additional mitigation measures required	Minor and localised effects	-
	3. Macroinvertebrates	-	-	There will be temporary loss of macroinvertebrates and habitat over the length of the existing watercourse that lies within the diverted section. - No baseline data available but community likely to require less than 1 year to re-establish give the short distance affected. - There is also the potential for impacts during construction (e.g., release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised.	- The river diversion will replicate existing habitat and where possible will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach. - Embedded mitigation to include retaining and if possible enhancing the overall quality of the watercourses, for example by including meanders and enhanced banks. - Improvements along watercourse either side of culvert, sufficient to maintain open length and watercourse gradient. NOTE THEIR IS A COMMENT IN CHAPTER 2 AS TO WHETHER THIS IS ACHEIVABLE.	- No hydromorphological effects anticipated and therefore no effect on macroinvertebrate communities	- Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrate habitats within the culvert. - No baseline data available, but this is a small trib that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Macroinvertebrate community may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor. - No baseline data available, but this is a tributary that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the extended culvert) may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediate downstream area). - No baseline data available, but this is a small trib. that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	None identified	- Only minor and localised effects anticipated, when considered separately or cumulatively	No additional mitigation measures required.	No additional mitigation measures required		
	4. Fish	-	-	There will be temporary loss of fish habitat over the length of the existing watercourse that lies within the diverted section. - No fish data available, but it is likely to require less than 1 year to re-establish give the short distance affected. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - Effects will be temporary and localised	- The river diversion will replicate existing habitat and where possible be designed to include a range of habitats that are suitable for the fish species present The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities. - Embedded mitigation to include retaining and if possible enhancing the overall quality of the watercourses, for example by including meanders and enhanced banks. - Improvements along watercourse either side of culvert, sufficient to maintain open length and watercourse gradient. NOTE THEIR IS A COMMENT IN CHAPTER 2 AS TO WHETHER THIS IS ACHEIVABLE.	- No hydromorphological effects anticipated and therefore no effect on fish communities	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - No baseline data available, but this is a minor trib of a canal that would not affect the wider water body, therefore only minor and localised effects are anticipated.	- Landtake will reduce the availability of fish habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids), which will be managed by best practice measures and the CoCP. - No baseline data available, but this is a small trib feeder of a canal that would not affect the wider water body, therefore only minor and localised effects are anticipated.	Shading will only have negligible or no effects on fish.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel) likely to be minimal as there is already overal existing crossings (culverts), the culvert extension will be appropriately sized, and it is not likely that the extension will act as a barrier to fish migration. - No baseline data available, but this is a small tributary of a canal and would therefore not support communities of salmonids or other migratory fish and therefore only minor and localised effects are anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	None identified	- Only minor and localised effects anticipated, when considered separately or cumulatively	No additional mitigation measures required.	No additional mitigation measures required		
	Physico-Chemical status																
WFD classification elements	5. Dissolved Oxygen	High	-	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor beneficial with no degradation of current status anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	N/A	N/A	There is likely to be a minor impact on dissolved oxygen. Any impact is likely to have a local/temporary effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	None identified	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant, if necessary, treatment will be provided prior to discharge.	No additional mitigation required	No additional mitigation required	No significant effects	-
	6. pH	High	-	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	None identified					
	7. Phosphate	High	-	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in phosphate levels. This impact is likely to be minor/temporary in relation to tonnecate and the water body. Therefore, no change in status is anticipated.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	None identified					
	8. Ammonia	High	-	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	None identified					
	9. Temperature	-	-	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	There is likely to be a minor impact on temperature. Any impact is likely to have a local/temporary effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	None identified					
	10. Specific Pollutants (Annex VIII)	High	-	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	None identified					
	Hydromorphological status																**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A		No effects on hydromorphology anticipates, due to insignificant changes in hydromorphological regime.	No additional mitigation required	No additional mitigation required	No significant effects	• Crossing affects canal, so there is no impact on hydromorphology
	12. Connection to Groundwater	-	-	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A						
	13. River continuity	-	-	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A						
	14. River depth and width variation bed	-	-	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A						
	15. Structure and substrate of river bed	-	-	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A						
	16. Structure of riparian zone	-	-	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A						

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen															
Manage disturbance	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	-	-	Minor/localised and temporary effects during construction of viaducts, diversions and culverts (to be managed by CoCP).	None required.	None required.		
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone.	-	-		Embedded mitigation measures will enhance ecological value of habitat			Some loss of habitat due to construction of culvert (localised)					None		None required.	None required.		
Avoid the need to dredge (e.g. minimise under-keel clearance; use fluid mud navigation; flow manipulation or training works)	-	-		-	-	-	-	-	-	-	-	-		-	-		
Prepare a dredging / disposal strategy	-	-		-	-	-	-	-	-	-	-	-		-	-		
Reduce impact of dredging	-	-		-	-	-	-	-	-	-	-	-		-	-		
Reduce sediment resuspension	-	-		-	-	-	-	-	-	-	-	-	Minor/localised and temporary effects during construction of viaducts, diversions and culverts (to be managed by CoCP).	-	-		
Alter timing of dredging / disposal	-	-		-	-	-	-	-	-	-	-	-		-	-		
Bank rehabilitation / reprofiling	-	-		-	-	-	-	-	-	-	-	-	Localised effects where structures near to or on banks.	-	-		
Site selection (dredged material disposal) (e.g. avoid sensitive sites)	-	-		-	-	-	-	-	-	-	-	-		-	-		
Awareness raising / information boards (boat wash / sources of fine sediment)	-	-		-	-	-	-	-	-	-	-	-		-	-		
Phased de-watering and other techniques	-	-		-	-	-	-	-	-	-	-	-		-	-		
Selective vegetation control regime	-	-		-	-	-	-	-	-	-	-	-		-	-		
Appropriate vegetation control technique	-	-		-	-	-	-	-	-	-	-	-		-	-		
Appropriate timing (vegetation control)	-	-		-	-	-	-	-	-	-	-	-		-	-		
Appropriate techniques (invasive species)	-	-		-	-	-	-	-	-	-	-	-		-	-		
Modify vessel design	-	-		-	-	-	-	-	-	-	-	-		-	-		
Vessel Management	-	-		-	-	-	-	-	-	-	-	-		-	-		
Sediment management	-	-		-	-	-	-	-	-	-	-	-		-	-		

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Hunts Green Viaduct 169-L3					Middleton Pool Cutting		Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB104028046850	Moderate	Good potential by 2027	Description of scheme element impact	Hunts Green Viaduct (underbridge) CFA20-SW-049 over a tributary of the Middleton Hall Catchment watercourse (appears to be an agricultural ditch), 14.3 m wide, 133.5 m long, mean height 4.3 m					Cutting may interrupt groundwater flows and lead to the transfer of water from Langley Brook catchment to Middleton				Construction	Operation		
(Middleton Hall Catch - trib of Langley Brook)			Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due	Change in water quality due to discharge of groundwater to a surface water body.						
WFD classification elements			Predicted change to status elements (green = none, amber = possibly, red = likely)													
1. Macrophytes and phytobenthos - diatoms				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
2. Macrophytes and phytobenthos - macrophytes	Not assessed	,		Receptor is insensitive to impact	Limited information available on the location of the bridge footings, however, given the small size of the watercourse it is more likely that it will be diverted to avoid any footings, if necessary. Therefore the only impact will be temporary landtake during construction and until the new channel and habitats establish. Effects are therefore considered to be minor, temporary and localised with no conceivable effect on the status of this element.	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. -There were no baseline macrophyte data available, however there would be a minor and highly localised effect on this minor tributary, which would not affect the status of this quality element.	No likely effects anticipated on this element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Slight increase in flows may be beneficial to Middleton Hall Catchment watercourse, as the status is currently 'Moderate' due to abstractions. Any beneficial effects are likely to be minor and/or localised.	Possible minor beneficial effects on element from improved water quality (due to increased base flows).	No upstream water body	- The Middleton Hall Catchment water body does not currently have a WFD status for macrophytes and is not known to be monitored for this element. - No data were collected on macrophytes within the watercourse as part of the baseline surveys. - Although the scheme will lead to loss of habitat and photosynthetic activity (in shaded areas) on a minor tributary, this is relatively minor within the context of the water body and there are some minor beneficial effects from the slight increase in flows associated with the cutting. - The overall effect on the current and future status of this element is likely to be neutral.	None required.	None required.	No significant effects	-
3. Macroinvertebrates	Not assessed	,		Receptor is insensitive to impact	As above	- Shading may have indirect effects on macroinvertebrates (if macrophyte cover is lost) -There were no baseline macroinvertebrate data available, but the overall effect is likely to be negligible.	No likely effects anticipated on this element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Slight increase in flows may be beneficial to Middleton Hall Catchment watercourse, as the status is currently 'Moderate' due to abstractions. Any beneficial effects are likely to be minor and/or localised.	Possible minor beneficial effects on element from improved water quality (due to increased base flows).	No upstream water body	- The Middleton Hall Catchment water body does not currently have a WFD status for macroinvertebrates and is not known to be monitored for this element. - No data were collected on macroinvertebrates within the watercourse as part of the baseline surveys. - Although the scheme may lead to temporary loss of habitat on a minor tributary during construction, this is relatively minor within the context of the water body and there are some minor beneficial effects from the slight increase in flows associated with the cutting. - The overall effect on the current and future status of this element is likely to be neutral.	None required.	None required.	No significant effects	-
4. Fish	Not assessed	,		Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). However, effects are likely to be temporary and localised with no impact on the water body as a whole or designated salmonid fishery.	As above	Shading will only have negligible or no effects on fish.	No likely effects anticipated on this element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Slight increase in flows may be beneficial to Middleton Hall Catchment watercourse, as the status is currently 'Moderate' due to abstractions. Any beneficial effects are likely to be minor and/or localised.	Possible minor beneficial effects on element from improved water quality (due to increased base flows).	No upstream water body	- The Middleton Hall Catchment water body does not currently have a WFD status for fish and is not known to be monitored for this element. It is not a designated cyprinid or salmonid river. - No data were collected on fish within the watercourse as part of the baseline surveys. - Although the scheme may lead to temporary construction effects, this is relatively minor within the context of the water body and there are some minor beneficial effects from the slight increase in flows associated with the cutting. - The overall effect on the current and future status of this element is likely to be neutral.	None required.	None required.	No significant effects	-
Physico-Chemical status																
WFD classification elements			Predicted change to status elements (green = none, amber = possibly, red = likely)													
5. Dissolved Oxygen	,	,		N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• Water quality could be improved due to slight increase in volume, increasing rivers dilution capacity. Any beneficial effects are likely to be minor and/or localised.	Possible minor beneficial effects on element from improved water quality (due to increased base flows).	No upstream water body	The slight increase in base flow in a catchment that is already deteriorated due to abstraction would help to improve hydromorphological conditions, but greater benefits would be seen if this is combined with other mitigation measures	None required.	None required.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	-
6. pH	,	,		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No upstream water body					
7. Phosphate	,	,		N/A	N/A	N/A	• Crossing design is effectively an open span bridge, so there would be no impact on Phosphate.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• Water quality could be improved due to slight increase in volume, increasing rivers dilution capacity. Any beneficial effects are likely to be minor and/or localised.	Possible minor beneficial effects on element from improved water quality (due to increased base flows).	No upstream water body					
8. Ammonia	,	,		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	• Water quality could be improved due to slight increase in volume, increasing rivers dilution capacity. Any beneficial effects are likely to be minor and/or localised.	Possible minor beneficial effects on element from improved water quality (due to increased base flows).	No upstream water body					
9. Temperature	,	,		N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No upstream water body					
10. Specific Pollutants (Annex VIII)	,	,		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• Water quality could be improved due to slight increase in volume, increasing rivers dilution capacity. Any beneficial effects are likely to be minor and/or localised.	Possible minor beneficial effects on element from improved water quality (due to increased base flows).	No upstream water body					
Hydromorphological status																**Hydromorphology Baseline**
WFD classification elements			Predicted change to status elements (green = none, amber = possibly, red = likely)													
11. Quantity and dynamics of river flow	,	,		N/A	N/A	N/A	• Crossing is effectively an open span bridge, channel width is approximately 1 m or less, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	• water body is a HMWB due to urbanisation and is at moderate status due to abstraction • Increasing base flow would have a positive effect on surface water flows • Cross-catchment inflows should replicate the pre-abstraction hydrograph in Middleton Hall Catchment (i.e. base flow rate and proportion of base flow relative to surface runoff) to restore surface water flow rates, velocities and dynamics	N/A	No upstream water body	• Crossing is effectively an open span bridge, channel width is approximately 1 m or less, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings • Increasing base flow in a catchment that is already deteriorated due to abstraction would help to improve hydromorphological conditions, but greater benefits would be seen if this is combined with other mitigation measures	• Use construction method statements to plan and minimise impacts • Adopt best construction practice to minimise sediment influx to channels	• Change operational regime of weirs and locks • Introduce riparian vegetation/green corridors • Reconnect and restore historic aquatic habitats • Recreate a sinuous river channel (re-meandering) • Recreation of gravel bars and riffles using permanent and/or temporary bed • structures (increase morphological diversity) • Retain marginal vegetation • Use of engineering techniques to assist natural recovery • Use soft engineering techniques	No significant effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
12. Connection to Groundwater	,	,		N/A	N/A	N/A		N/A	• Groundwater connectivity could be restored, but cross-catchment inflows should replicate the pre-abstraction hydrograph in Middleton Hall Catchment (i.e. base flow rate and proportion of base flow relative to surface runoff) to restore surface water flow rates, velocities and dynamics	N/A	No upstream water body					
13. River continuity	,	,		N/A	N/A	N/A		N/A	• Increasing flow rates would help to restore flow depths and riparian & floodplain connectivity and decrease excess sedimentation	N/A	No upstream water body					
14. River depth and width variation bed	,	,		N/A	N/A	N/A		N/A	• The channel has been extensively straightened, so there is little variation in width and depth at present • Restoring base flow would be beneficial in itself, but the main opportunity to increase variance in flow and width would if other mitigation measures (e.g. increasing channel sinuosity) could be implemented as well	N/A	No upstream water body					
15. Structure and substrate of river bed	,	,		N/A	N/A	N/A		N/A	• Increasing base flow would increase sediment resuspension and conveyance through Middleton Hall Catchment, which would be to the benefit of bed substrates • The increased base flow would be 'clean' water, as opposed to sediment-laden surface runoff • Since the channel has already been straightened, runoff rates may be too high and may have resulted in scour of any bed formations. This would need to be mitigated	N/A	No upstream water body					
16. Structure of riparian zone	,	,		N/A	N/A	N/A		N/A	• Increasing flow rates would help to restore riparian and floodplain connectivity	N/A	No upstream water body					

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen														
Retain marginal aquatic and riparian habitats (channel alteration)	,	By 2027	Predicted change to status elements (green = none, amber = possibly, red = likely)	,	,	,	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	,	,	,	,	Existing marginal and riparian habitats will be lost if the channel is realigned, and there may be minor changes in marginal macrophyte assemblages due to shading.	,	,	Potential adverse effect	N/A
Re-opening existing culverts	,	By 2027		,	,	,		,	,	,	,	No effect on implementation of measure	,	,	No significant effects	N/A
Increase in-channel morphological diversity	,	By 2027		,	,	,		,	,	,	,	No effect unless realignment required, in which case design will aim to maintain or improve upon existing hydromorphological regime	,	,	No significant effects	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Langley Brook Viaduct 171-S1					Culvert - Existing culvert under A4091 lengthened					Middleton Pool Cutting		Impacts from other WFD water bodies (assessed separately)	OVERALL impact on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB104028046890	Poor	Good Ecological Status by 2027	Description of scheme element impact	14.3 m wide, 183.5 m long, mean height 4.2 m, max height 5.25 m, no footings in watercourse or riparian zone					Short lengthening of culvert under A4091, no details available					Cutting may interrupt groundwater flows and lead to the transfer of water from Langley Brook catchment to Middleton Hall catchment (<10% of estimated Q95 of either catchment).				Construction	Operation		
Langley Brook from Source to Middleton Hall Catch			Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	Moderate	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	Not assessed	-		Receptor is insensitive to impact	No footings in watercourse or riparian zone	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - The baseline data indicates that macrophytes (Ranunculus sp.) are present within this section. There would be a minor and highly localised effect on these macrophyte communities, but this would not affect the status of this quality element.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert (no macrophyte data available). - However, only a short increase is proposed and there would be no conceivable effect on this element at a water body level. - Mitigation measures described in the ES Water Chapter Volume 5 proposed will reduce most effects on this element (notably improvements along watercourse either side of the culvert).	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - There are no macrophyte data available, but there would only be a localised and minor effects on macrophyte communities, not affecting the status of this quality element.	No likely effects on macrophyte community from minor changes in water body hydromorphology.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Possible minor and localised changes to plant communities due to slight decrease in flows.	Minor and localised effects, no change in WFD class of element.	No effects identified.	- Langley Brook does not currently have a WFD status for macrophytes and is not known to be monitored for this element - Baseline data collected showed that macrophytes (Ranunculus) were present within the vicinity of the crossing, but detailed data were not available; - Although the scheme will lead to a small loss of flow and loss of habitat and photosynthetic activity (in shaded areas) these area relatively minor within the context of water body and measures included as part of the scheme will mitigate for the minor localised deteriorations identified. - The overall effect on the current and future status of this element is likely to be minor and highly localised (not affecting status), if embedded mitigation measures are implemented.	None required.	None required.	N/A	
	3. Macroinvertebrates	Poor	-		Receptor is insensitive to impact	No footings in watercourse or riparian zone	- Shading may have indirect effects on macroinvertebrates (if macrophyte cover is lost) - the baseline data suggest that the invertebrate community is locally of low quality, 'stressed' and not highly sensitive - the overall effect is likely to be of negligible magnitude or no effect, with no anticipated effects on the wider water body.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrates and reduce the habitats available for colonisation within the culvert. - The baseline macroinvertebrate data indicate that the invertebrate community is currently 'stressed' and therefore not highly sensitive to impacts, and given the extent of the proposed culvert extension there would be no conceivable effect on this element at a water body level. - Mitigation measures described in the ES Water Chapter Volume 5 proposed will reduce most effects on this element (notably improvements along watercourse either side of the culvert). - It is important that the culvert is positioned so that natural habitat substrate can deposit.	- Shading may have indirect effects on macroinvertebrates (if macrophyte cover is lost) - These are likely to be negligible and within the context of the water body, with no anticipated effects on the wider water body.	No likely effects on invertebrate community from minor changes in water body hydromorphology.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Possible minor and localised changes to invertebrate communities due to slight decrease in flows. Invertebrate community present described as 'stressed' and therefore not highly sensitive to impacts. Only minor and localised effects anticipated.	Minor and localised effects, no change in WFD class of element.	No effects identified.	- Langley Brook is currently of Poor status for macroinvertebrates. This is supported by the baseline data. - Although the scheme will lead to loss of habitat this is relatively minor within the context of the water body and measures described will mitigate for the minor localised deteriorations identified. - The overall effect on the current and future status of this element is likely to be minor and highly localised (not affecting status), if embedded mitigation measures are implemented.	None required.	None required.	N/A	-
	4. Fish	Not assessed	-		Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). However, effects are likely to be temporary and localised with no impact on the water body as a whole or designated salmonid fishery	No footings in watercourse or riparian zone	Shading will only have negligible or no effects on fish.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) - Effects are likely to be temporary and localised with no impact on the water body as a whole or designated salmonid fishery	- Landtake is unlikely to result in direct mortality of fish but there will be direct loss of fish habitats available for colonisation within the culvert. Baseline fish data indicate that the watercourse is not of significant importance to fish and it isn't a designated salmonid fishery. - Mitigation measures described in the ES Water Chapter Volume 5 proposed will reduce most effects on this element (notably improvements along watercourse either side of the culvert). - It is important that the culvert is positioned so that natural habitat substrate can deposit.	Shading will only have negligible or no effects on fish.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- As there is an existing culvert, it is not likely that the extension will act as a significant barrier to fish migration water body not designated salmonid fishery and baseline data show it is currently a mixed coarse fishery with no records of salmonid fish therefore only minor and localised effects anticipated.	Possible minor and localised changes to fish communities due to slight decrease in flows. Baseline data indicate that only minor species are present, it is not a designated fishery and therefore not highly sensitive to impacts. Only minor and localised effects anticipated.	Minor and localised effects, no change in WFD class of element.	No effects identified.	- Langley Brook does not currently have a WFD status for fish and is not known to be monitored for this element. - Langley Brook is not a designated cyprinid fishery and no salmonid species were identified during the baseline survey. The scheme will lead to loss of habitat and there is the but is not deemed to act as a barrier to migrating fish - The mitigation measures proposed will mitigate for the potential deteriorations identified. - The overall effect on the current and future status of this element is likely to be minor and highly localised (not affecting status), if embedded mitigation measures are implemented.	None required.	None required.	N/A	
	Physico-Chemical status																				
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	The lengthening of the existing culvert is likely to have a very minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	Minor and localised effects, no change in WFD class of element.	No effects identified.	Potential minor and localised effects on element.			N/A	
	6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No effects identified.	Receptor is insensitive to impact			N/A	
	7. Phosphate	Bad	-		N/A	N/A	N/A	hy an open span bridge, so there would	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminates, including phosphate from source and diffuse pollution.	Minor and localised effects, no change in WFD class of element.	No effects identified.	Depending on how much flow is lost, potential minor and localised effects on element. Multiple sewage discharge consents on Langley Brook. The phosphate status cannot be deteriorated any further than 'Bad', therefore this effect will be presented in the prevention to future good status assessment.	None required.	None required.	N/A	-
	8. Ammonia	Good	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Minor and localised effects, no change in WFD class of element.	No effects identified.	Potential minor and localised effects on element.			N/A	
	9. Temperature	High	-		N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	he lengthening of the existing culvert is likely to have a very minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No effects identified.	Receptor is insensitive to impact			N/A	
	10. Specific Pollutants (Annex VIII)	-	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Minor and localised effects, no change in WFD class of element.	No effects identified.	Potential minor and localised effects on element.			N/A	
	Hydromorphological status																				**Hydromorphology baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• Crossing is effectively an open span bridge, channel width is approximately 2-3 m or less, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	N/A	N/A	N/A	• Lengthening the existing A4091 culvert westwards, where the channel at present is straight (probably artificially straight to align the channel with the culvert and adjacent ponds) would have probably have no measurable impact on existing conditions, but culverts and culvert extensions are still detrimental to river processes	N/A	• Potential localised decrease in flow quantity and dynamics	N/A	No effects identified.	• Realistically, a viaduct with footings set back from the channel, and a short culvert extension would have little overall impact. The development opportunity should be used to implement mitigation measures to offset the impact of the existing culvert and possible channel straightening, but this should be kept proportional to the scale of impact	None required.	None required.	N/A	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A		N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	• Potential reduction in groundwater inflows due to cutting	N/A	No effects identified.					
	13. River continuity	-	-		N/A	N/A	N/A		N/A	N/A	N/A	N/A	• Culverts disconnect floodplains and out-of-bank flows, and bank and riparian habitats and can effectively sever flow, sediment, and habitat continuity • Extending the existing culvert is unlikely to have any measurable impact, but culverts and culvert extensions are still detrimental to river processes	N/A	• Flow depths and along-stream and lateral (riparian and floodplain) connectivity could be reduced in the depleted reach, sediment deposition could increase as a result	N/A	No effects identified.					
	14. River depth and width variation bed	-	-		N/A	N/A	N/A		N/A	N/A	N/A	N/A	• Out-of bank flows may be constrained by the culvert, but there would be no change from existing conditions	N/A	• Flow depths and widths could be decreased, with a reduction in wetted areas	N/A	No effects identified.					
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A		N/A	N/A	N/A	N/A	• Extending the existing culvert is unlikely to have any measurable impact on bed conditions, but culverts and culvert extensions are still detrimental to river processes	N/A	• Flow reductions could result in increased sedimentation and degradation of the channel bed	N/A	No effects identified.					
	16. Structure of riparian zone	-	-		N/A	N/A	N/A		N/A	N/A	N/A	N/A	• Culverts disconnect the channel from banks, riparian zones and floodplains. Extending the existing culvert would mean there minimal change from existing conditions, but culverts and culvert extensions are still detrimental to river processes	N/A	• Reduced flows could result in decreased flow depths and reduced channel - riparian connectivity	N/A	No effects identified.					

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NONE in Appendix B of RBMP	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Drayton Basset Viaduct 173-L1					Gallows Brook Culvert No1 172-S3 and Gallows Brook Culvert No2 172-S4					Impacts from other WFD water bodies (assessed separately)	OVERALL impact on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
	GB104028046900	Moderate	Good by 2027	Description of scheme element impact	*Viaduct with the following dimensions: 247.5 m length, mean height 4.9 m and width 14.3 m, . Crosses a tributary of Langley Brook and a connected ditch no footings in watercourse or riparian zone, but nearby embankment and footings in flood plain.*					*Two box culverts (limited data) crossing Gallows Brook*							Construction	Operation		
	Langley Brook from Middleton Hall Catch to River Tame			Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage					
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	2. Macrophytes and phytobenthos - macrophytes	Not assessed	-		Receptor is insensitive to impact	No footings in river or adjacent	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. -Baseline data suggests that macrophyte cover is very low in the watercourse, as it heavily shaded. -The would only be a minor and highly localised effect on this tributary of Langley Brook, which would not affect the status of this quality element.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert - However, only relatively short distance of a minor upstream tributary (ditch) affected with moderate macrophyte cover and there would be no conceivable effect on this element at a water body level. - Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the culvert).	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - There would only be a localised and minor effects on macrophyte communities, not affecting the status of this quality element.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert) may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediate downstream area). -This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	No significant effects identified on upstream water bodies	- Langley Brook does not currently have a WFD status for macrophytes and is not known to be monitored for this element. - Baseline data undertaken on the potentially affected upstream tributaries of Langley Brook indicated that macrophytes were not highly diverse or abundant, although some variability was recorded. - Although the scheme will lead to a loss of habitat and photosynthetic activity (in shaded areas) on these tributary, this is relatively minor within the context of the water body. - The overall effect on the current and future status of this element is likely to be neutral.	None required.	None required.	Minor and localised effects	-
	3. Macroinvertebrates	Moderate	-		Receptor is insensitive to impact	No footings in river or adjacent	- Shading has the potential to have indirect effects on macroinvertebrates (if macrophyte cover is lost), however as macrophyte cover is currently very low there would be no effects or negligible effects on macroinvertebrates.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrates and reduce the habitats available for colonisation within the culvert. - Baseline survey data showed that the invertebrates to be of moderate diversity, but indicative of a stressed community - Given the relative contribution of this minor tributary and the invertebrate community present, there itchen there would be no conceivable effect on this element at a water body level. - Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the culvert).	- Shading may have indirect effects on macroinvertebrates (if macrophyte cover is lost) These are likely to be of no effect or negligible and given the relative importance of this tributary, with no anticipated effects on the wider water body.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert) may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably immediately downstream). -This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	No significant effects identified on upstream water bodies	- Langley Brook currently has a moderate WFD status for macroinvertebrates. - Data collected on the potentially affected tributaries were indicative of a stressed community - Although the scheme may lead to loss of habitat on these minor tributaries, this is negligible within the context of the water body. - The overall effect on the current and future status of this element is likely to be neutral.	None required.	None required.	Minor and localised effects	-
	4. Fish	Not assessed	-		Possible temporary sub-lethal effects on fish (e.g. displacement from impacted area). However, effects are likely to be temporary and localised with no impact on the water body as a whole.	No footings in river or adjacent	Shading will only have negligible or no effects on fish.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) Survey data show that the ditch has poor fish habitat and is species poor (only stickleback recorded) Effects are likely to be temporary and localised with no impact on the water body as a whole	- Landtake is unlikely to result in direct mortality of fish but there will be direct loss of fish habitats available for colonisation within the culvert. - Survey data show that the ditch has poor fish habitat and is species poor (only stickleback recorded) - Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the culvert).	Shading will only have negligible or no effects on fish.	- Localised changes in flow dynamics (potential increased flow due to the straightened channel in the culvert) and the presence of the culvert have the potential to impede upstream passage of any migratory fish. - Survey data show that the ditch has poor fish habitat and is species poor (only stickleback recorded) and the watercourse at this location is near the head of the watercourse and has no potential for migratory fish based on the habitat data collected - There would therefore be only very limited effects from changes to hydromorphology on fish populations, with no conceivable effects on migratory fish. Any effects would therefore be highly localised and minor.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	No significant effects identified on upstream water bodies	- Langley Brook does not currently have a WFD status for fish and is not known to be monitored for this element. - Baseline data undertaken on the potentially affected upstream tributaries of Langley Brook indicated that fish habitat was poor and there was a species poor within the potentially affected Gallows Brook - and there would only be very minor localised or no measurable effects - The overall effect on the current and future status of this element is likely to be neutral.	None required.	None required.	Minor and localised effects	-
	Physico-Chemical status																			
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	No significant effects identified on upstream water bodies	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	No significant impacts predicted	-
	6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No significant effects identified on upstream water bodies					
	7. Phosphate	Bad	-		N/A	N/A	N/A	effectively an open span bridge, so there would be no i	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	No significant effects identified on upstream water bodies						
	8. Ammonia	Good	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No significant effects identified on upstream water bodies					
	9. Temperature	High	-		N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	No significant effects identified on upstream water bodies					
	10. Specific Pollutants (Annex VIII)	-	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	No significant effects identified on upstream water bodies						
	Hydromorphological status																			**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• Embankment in the floodplain would constrain peak flows and cause local increases in flow velocity and turbulence. • Overall, the size of the channel (2m width or less) is likely to mean there would be no detrimental hydromorphological effects	N/A	N/A	N/A	N/A	• Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in increased flow velocities due to increased channel gradients and decreased roughness. • Gallows Brook is a minor tributary of Langley Brook, and in practical terms the culvert would impact a small proportion of the water body	N/A	No significant effects identified on upstream water bodies	• No significant impacts for Drayton Brook Viaduct • For Gallows Brook, culvert could constrain flows, even though the brook is a minor feature	Hydromorphological surveys to be undertaken to aid detailed design development. Hydromorphological mitigation should be included into detailed design where practicable. Mitigation measures that might be incorporated include: • Create low flow channels in over-widened/over-deepened channels • Create reed fringes • Introduce riparian vegetation/green corridors where space allows • Recreate a sinuous river channel (re-meandering) • Retain marginal vegetation • Use of engineering techniques to assist natural recovery • Use soft engineering techniques			Minor and localised effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	• Not significant to hydromorphology	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	No significant effects identified on upstream water bodies	• Likely to be no significant relationship between hydromorphology and groundwater			No significant effects	
	13. River continuity	-	-		N/A	N/A	N/A	• Embankments in the floodplain would decrease natural continuity by the presence of physical obstacles • Size of channel means this would only be an issue at extreme flows, and overall is not considered significant	N/A	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity adjacent to both sides of the channel. • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A	No significant effects identified on upstream water bodies	• No significant impacts for Drayton Brook Viaduct • For Gallows Brook, culvert could alter in-channel continuity and sever out-of-bank continuity			Minor and localised effects	
	14. River depth and width variation bed	-	-		N/A	N/A	N/A	• Floodplain flows would be inhibited by the embankments • However, the size of the channel suggests there is unlikely to be significant diversity of river depth and width, and in practical terms there would be no significant effect	N/A	N/A	N/A	N/A	culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The culvert would homogenise channel morphology • Some scour may occur upstream and downstream of the structure as the river tries to regain flow and sediment regime equilibrium. This can create diversity, but can also create dead zones, and in some cases can result in the rigid culvert base becoming 'perched' if the base is not set at the correct gradient and below the bed as natural substrates are eroded adjacent to the culvert. This can create a stepped channel. which impedes continuity. • The size of the channel suggests there is unlikely to be significant diversity of river depth and width, but these impacts are still flagged as a	N/A	No significant effects identified on upstream water bodies	• No significant impacts for Drayton Brook Viaduct • For Gallows Brook, unlikely to be any significant effects, but the culvert is a risk to natural channel geometry			Minor and localised effects	
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• Size of channel means there is unlikely to be much diversity in bed conditions, and overall effects are not considered significant	N/A	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour. • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk as described above	N/A	No significant effects identified on upstream water bodies	• No significant impacts for Drayton Brook Viaduct • For Gallows Brook, riparian zones would be severed			No significant effects	
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	• Footings are set back from riparian zones	N/A	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of	N/A	No significant effects identified on upstream water bodies	• No significant impacts for Drayton Brook Viaduct • For Gallows Brook, riparian zones would be severed			Minor and localised effects	

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen																		
None listed in RBMP. Reasons for failure include the following:	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
P1a - Phosphate or Total Phosphate	-	-		-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated	No additional mitigation required	No additional mitigation required	No effect anticipated	

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Black Brook Viaduct CFA21-SW-061					River Diversion			Roundhill Wood Culvert on Tributary of Black Brook (CFA21-SW-059 and CFA21-SW-060) and Hints Culvert on Tributary of Black Brook (CFA21-SW-058)					Cutting		Swinfen Cutting		Impacts from other WFD water bodies (assessed separately)	OVERALL impact on element	Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB104028047000	Moderate	Good Ecological Potential by 2027	Description of scheme element impact	*Viaduct over Black-Bourne Brook approximately 105m long with footings close to banks edge.*					*Diversion of Tributary of Black Brook into Roundhill Wood culvert (CFA21-SW-059 and CFA21-SW-060)*			*Culverts under Hints Embankment. . Lengths of culverts appear to be less than 60 m each.*					*Hints Cutting*		*Cutting may interrupt groundwater flows and lead to the transfer of water from East Litchfield catchment to Black Bourne Brook catchment . There will also be loss of flow to a minor tributary of Black Bourne Brook (small trib and springs near Bucks Head Farm) but not affecting the catchment as a whole.*				Construction	Operation		
Black-Bourne Brook from source (confluence) to River Tame			Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Creation of new habitats	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	Poor	-	Predicted change in status elements (green = none, amber = possible, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	-	-		Receptor is insensitive to impact	No footings in river	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. Baseline data indicates macrophytes are commonly abundant in the watercourse. However, the would only be a minor and highly localised effect on Black Brook.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in macrophytes.	- There will be loss of marginal and channel macrophytes over the length of the existing tributary of Black Brook that lies within the diverted section. The community will re-establish within 1 to 2 years of completion of the river diversion. No baseline data available, but effects would be short-term, relatively minor with respect to the main WFD water body and wouldn't affect the status of the WFD element. Only minor, temporary and localised effects are therefore anticipated.	The new channel should incorporate (if possible) marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species. The effect on this quality element is considered to be minor positive.	- No hydromorphological effects anticipated and therefore no effect on macrophyte communities.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. - There is also the potential for impacts during the length of a minor tributary will be affected. - Embedded mitigation measures will include improved habitat upstream and downstream of culvert. - Minor and localised effects anticipated.	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - No baseline data available, but only a limited length of a minor tributary will be affected. - Minor and localised effects anticipated.	- Localised changes in flow dynamics may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediately downstream). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minor and localised.	No impact. Runoff will be collected by drainage to balancing pond.	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated.	Only negligible effects on surface water quality identified in groundwater assessment, no effects on this WFD element anticipated.	Possible minor and localised effects on flows in minor tributary, but no overall adverse effect on flows in the main watercourse itself (there will be potentially be a minor increase due to transfer of water from East Litchfield catchment to Black Bourne Brook). Possible minor and localised effects on macrophytes in minor tributary.	Possible minor and localised effects on water quality in minor tributary, but no overall adverse effect on water quality in the main watercourse itself. Possible minor and localised effects on macrophytes in minor tributary.	Not required. Upstream water body not impacted by Scheme.	- Black Brook does not currently have a WFD status for macrophytes and is not known to be monitored for this element. - Limited data were collected on macrophytes within the Black Brook as part of the baseline surveys. The scheme will lead to loss of habitat and there is the potential for barriers to upstream fish migration from the culvert to allow for fish passage) will mitigate for the potential deteriorations identified. The overall effect on the current and future status of this element is likely to be neutral. If mitigation measures are implemented, with no overall effect on WFD status of this element.	None required.	- Measures to improve macrophyte habitat or mitigate any adverse effects form part of the embedded mitigation measures described previously. - However, additional mitigation measures may be required, given the lack of data and length of the tributaries affected. These should include channel habitat improvements (e.g. marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species) and planting of macrophytes in the immediately upstream and downstream of the culvert. A further assessment of the watercourse should be undertaken to establish necessary habitat improvement measures within the tributary, or Black Brook itself. - Further, construction and post-construction monitoring should be considered (if necessary) to assess any effects on invertebrates	Minor and localised effects	
	3. Macroinvertebrates	Poor	-		Receptor is insensitive to impact	No footings in river	- Shading has the potential to have indirect effects on macroinvertebrates (if macrophyte cover is lost), however as the macroinvertebrate community is of poor quality (and less sensitive to impacts) there would be no effects or negligible effects on macroinvertebrates.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in macroinvertebrates.	- Temporary loss of macroinvertebrates over the length of the existing tributary of Black Brook that lies within the diverted channel. - Possible temporary effects associated with suspension of solids during the construction works (associated with reduced DO) likely to lead to a short-term adverse effect on macroinvertebrate abundances and diversity. - No invertebrate baseline data available from the tributary, but invertebrate communities are likely to recover within several months to a year, given the proposed habitat creation in new river channel.	- The diversion should be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach. The effect on this quality element is considered to be minor positive.	- No hydromorphological effects anticipated and therefore no effect on macroinvertebrate communities.	Receptor is insensitive to impact	- Landtake will reduce the availability of macroinvertebrate habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids). - No baseline data available, but only a limited length of a minor tributary will be affected. - Embedded mitigation measures will include improved habitat upstream and downstream of culvert. - Minor and localised effects anticipated.	- Loss of macrophytes may lead to indirect effects on macroinvertebrates, due to loss of habitat. - No baseline data available, but a significant length of two tributaries will be affected (not the main WFD water body) - It is anticipated that this will have a minor impact, not affecting the WFD status for this element	- Localised changes in flow dynamics may result in changes to macrophyte communities within the immediate vicinity of the culvert (notably in immediately downstream). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minor and localised.	No impact. Runoff will be collected by drainage to balancing pond.	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated.	Only negligible effects on surface water quality identified in groundwater assessment, no effects on this WFD element anticipated.	Possible minor and localised effects on flows in minor tributary, but no overall adverse effect on flows in the main watercourse itself (there will be potentially be a minor increase due to transfer of water from East Litchfield catchment to Black Bourne Brook). Possible minor and localised effects on flow-sensitive macroinvertebrates in minor tributary due to reduced base flows.	Possible minor and localised effects on water quality in minor tributary, but no overall adverse effect on water quality in the main watercourse itself. Possible minor and localised effects on macroinvertebrates in minor tributary.	Not required. Upstream water body not impacted by Scheme.	- Black Bourne Brook is currently of Poor status for macroinvertebrates also. This is supported by the baseline surveys. The scheme will lead to loss of habitat and there is the potential for barriers to upstream fish migration from the culvert to allow for fish passage) will mitigate for the potential deteriorations identified. The overall effect on the current and future status of this element is likely to be neutral. If mitigation measures are implemented, with no overall effect on WFD status of this element.	None required.	- Measures to improve macroinvertebrate habitat or mitigate any adverse effects form part of the embedded mitigation measures described previously. - However, additional mitigation measures may be required, given the lack of data and length of the tributaries affected. These should include channel habitat improvements (e.g. pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa for an extended distance other than immediately upstream and downstream of the culvert. A further assessment of the watercourse should be undertaken to establish necessary habitat improvement measures within the tributary, or Black Brook itself.	Minor and localised effects	-
	4. Fish	Moderate	-		Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) is expected. However, the watercourse within the vicinity of Black Brook in this section is characterised by a species poor coarse fishery and effects are likely to be temporary and localised with no impact on the water body as a whole.	No footings in river	Shading will only have negligible or no effects on fish.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in fish.	- Temporary loss of fish and fish habitat over the length of the existing tributary of Black Brook that lies within the diverted channel. - Possible temporary effects associated with suspension of solids during the construction works (associated with reduced DO) likely to lead to a short-term adverse effect on fish while the new channel establishes. No fish data available, but given the small size of the tributary, it is not likely to be of high value to fish or contribute significantly to the fish population in Black Brook. Fish are likely to colonise the new channel and will recover within several months. Only minor, temporary and localised effects are therefore anticipated.	- The range of habitats incorporated into the diverted channel is considered to represent an improvement for fish communities.	- No hydromorphological effects anticipated and therefore no effect on fish communities.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) is expected. Effects are likely to be temporary and localised with no impact on the water body as a whole or designated salmonid fishery.	- Landtake will reduce the availability of fish habitats within the culvert. - There is also the potential for impacts during construction (e.g. release of suspended solids). - No baseline data available, but only a limited length of a minor tributary will be affected. - Embedded mitigation measures will include improved habitat upstream and downstream of culvert. - Minor and localised effects anticipated.	Loss of macrophytes may lead to indirect effects on fish, due to loss of habitat. - No baseline data available, but a significant length of two tributaries will be affected (not the main WFD water body) - It is anticipated that this will have a minor impact, not affecting the WFD status for this element	- Localised changes in flow dynamics and the presence of the culvert will not impede upstream passage of any migratory fish provided the culvert is sized and designed appropriately. There a very low number of fish species in the tributary and no data are available for fish on this tributary. - Only minor and localised effects are anticipated provided embedded mitigation measures are implemented (including the improvements to habitat upstream and downstream of the culverts, appropriate design of culvert for fish passage etc.)	No impact. Runoff will be collected by drainage to balancing pond.	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated.	Only negligible effects on surface water quality identified in groundwater assessment, no effects on this WFD element anticipated.	Possible minor and localised effects on flows in minor tributary, but no overall adverse effect on flows in the main watercourse itself (there will be potentially be a minor increase due to transfer of water from East Litchfield catchment to Black Bourne Brook). Possible minor and localised effects on fish in minor tributary due to reduced base flows.	Possible minor and localised effects on water quality in minor tributary, but no overall adverse effect on water quality in the main watercourse itself. Possible minor and localised effects on fish in minor tributary.	Not required. Upstream water body not impacted by Scheme.	- Black Bourne Brook is of moderate status for fish. The scheme will lead to loss of habitat and there is the potential for barriers to salmonid fish migration from proposed culverting of a tributary of the Kitchen. The scheme will include mitigation (i.e. design of the culvert to allow for fish passage) will mitigate for the potential deteriorations identified. The overall effect on the current and future status of this element is likely to be minor and localised, if mitigation measures are implemented, with no overall effect on WFD status of this element.	None required.	- Measures to mitigate any adverse effects on fish form part of the embedded mitigation measures described previously. - These measures include channel improvements to habitat within the proximity of the culvert on the minor tributary - Although this tributary is not known to be of importance for migratory fish (no baseline habitat data for fish), consideration will be required to ensure that the culvert is designed and installed to allow fish passage. An assessment of the culvert with relation to flows and fish passage must be included as part of the detailed design development. - Further surveys to assess the value of the tributary to fish may be undertaken as part of the scheme's EIA. Further construction and post-construction monitoring should be considered (if necessary) to assess any effects on fish migration	Minor and localised effects	
	Physico-Chemical status																								
WFD classification elements	5. Dissolved Oxygen	High	-	Predicted change in status elements (green = none, amber = possible, red = likely)	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. • The new channel can provide when re-established, similar/marginally improved dissolved oxygen levels. Overall effect likely to be minor locally, with no degradation of the element status anticipated at the scale of the water body.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes in river processes may cause a temporary increase in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body. Therefore, no change in status is anticipated.	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated	Only negligible effects on surface water quality identified in groundwater assessment, no effects on this WFD element anticipated	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	Possible minor and localised effects on water quality in minor tributary, but no overall adverse effect on water quality in the main watercourse itself.	Not required. Upstream water body not impacted by Scheme.	Depending on how much flow is lost, potential minor and localised effects on element. No overall adverse effect on water quality in the main water body as a whole.	None required.	None required.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and contaminated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	-
	6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated	Only negligible effects on surface water quality identified in groundwater assessment, no effects on this WFD element anticipated	Receptor is insensitive to impact	Receptor is insensitive to impact	Not required. Upstream water body not impacted by Scheme.	Receptor is insensitive to impact			
	7. Phosphate	Bad	-		N/A	N/A	N/A	y an open span bridge, so there would	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated	Only negligible effects on surface water quality identified in groundwater assessment, no effects on this WFD element anticipated	• Water quality could be reduced in the depleted reaches due to reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Possible minor and localised effects on water quality in minor tributary, but no overall adverse effect on water quality in the main watercourse itself.	Not required. Upstream water body not impacted by Scheme.	Depending on how much flow is lost, potential minor and localised effects on element. No overall adverse effect on water quality in the main water body as a whole.	None required.	None required.		-
	8. Ammonia	Good	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated	Only negligible effects on surface water quality identified in groundwater assessment, no effects on this WFD element anticipated	• Water quality could be reduced in the depleted reaches due to reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Possible minor and localised effects on water quality in minor tributary, but no overall adverse effect on water quality in the main watercourse itself.	Not required. Upstream water body not impacted by Scheme.	Depending on how much flow is lost, potential minor and localised effects on element. No overall adverse effect on water quality in the main water body as a whole.				
	9. Temperature	-	-		N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated	Only negligible effects on surface water quality identified in groundwater assessment, no effects on this WFD element anticipated	Receptor is insensitive to impact	Receptor is insensitive to impact	Not required. Upstream water body not impacted by Scheme.	Receptor is insensitive to impact			
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated	Only negligible effects on surface water quality identified in groundwater assessment, no effects on this WFD element anticipated	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of incident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Possible minor and localised effects on water quality in minor tributary, but no overall adverse effect on water quality in the main watercourse itself.	Not required. Upstream water body not impacted by Scheme.	Depending on how much flow is lost, potential minor and localised effects on element. No overall adverse effect on water quality in the main water body as a whole.				
	Hydromorphological status																								Hydromorphology Baseline
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change in status elements (green = none, amber = possible, red = likely)	N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant platform change that could mean that the river erodes the channel bed and banks. • Overall, there would probably be no hydromorphological impact	N/A	N/A	N/A	• Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics • The watercourse tributary of the Black Brook, and in practical terms, represents a small proportion of the water body • The extent of the diversion is unlikely to have any measurable effects • Overall, it is considered that the impacts on flow dynamics are unlikely	• The watercourse is small (2m channel width or less) so there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness.	N/A	N/A	N/A	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated	N/A	• Possible effects on dry weather flow in minor tributary. This would not affect the Black Brook itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	N/A	Not required. Upstream water body not impacted by Scheme.	• The viaduct is unlikely to have any significant impact • The culverts are extensive and likely to cause deterioration • However, the culverts are on minor tributaries and overall would not cause deterioration to the principal watercourse of the water body and would not result in water body status change	Undertake hydromorphological surveys to aid detailed design development. Incorporate hydromorphological mitigation measures into detailed design where practicable. Mitigation measures might include: • Bank reprofiling (rehabilitation) • Bank revetment • Creation of shallow margin in front of hard defence • Install silt, sand or gravel traps • Introduce riparian vegetation/green corridors where space allows • Recreate a sinuous river channel (re-meandering) where space allows • Recreation of gravel bars and riffles using permanent and/or temporary bed structures (increase morphological diversity) • Retain marginal vegetation • Use of engineering techniques to assist natural recovery • Use soft engineering techniques	Minor and localised effects	• Hydromorphology baseline is derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossing, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated	N/A	N/A	Not required. Upstream water body not impacted by Scheme.					
	13. River continuity	-	-		N/A	N/A	N/A		N/A	N/A	N/A	• The size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively, cause mixing flow and habitat continuity within and adjacent to both sides of the channel. • However, in wider body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated	N/A	• Possible effects on dry weather flow in minor tributary which could result in localised increases in sedimentation. This would not affect the Black Brook itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	N/A	Not required. Upstream water body not impacted by Scheme.					
	14. River depth and width variation	-	-		N/A	N/A	N/A		N/A	N/A	N/A	• The diversion would replicate existing channel geometry, and the extent of the diversion and size of the channel mean that in practical terms there would be no significant change	N/A	N/A	N/A	• The culvert would be smaller in the channel and in-channel flows may become deeper than natural peak flows, and may even cause a backwater effect upstream • The culvert would homogenise channel morphology • Scour adjacent to the structure upstream and downstream could result in sharp changes in channel geometry and a stepped channel / perched culvert base • The size of the channel suggests there could be significant loss of sediment to open channel and wildlife during works • The culvert would not be suitable for the transport of significant bed substrate or transport or scour, but bed structure could be homogenised • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated	N/A	• Possible effects on dry weather flow in minor tributary which could result in localised decreases in flow depths. This would not affect the Black Brook itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	N/A	Not required. Upstream water body not impacted by Scheme.					
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A		N/A	N/A	N/A	• Given the size of the watercourse there is probably no diversity in bed conditions and there would probably be no measurable impact as a result of the minor diversion	N/A	N/A	N/A	• The culvert would be smaller in the channel and in-channel flows may become deeper than natural peak flows, and may even cause a backwater effect upstream	N/A	Only negligible effects on flow to surface water identified in groundwater assessment, no effects on this WFD element anticipated	N/A	• Possible effects on dry weather flow in minor tributary which could result in localised decreases in flow depths and reduced channel-riparian connectivity. This would not affect the Black Brook itself, but there could possibly be minor and localised effects in the tributary (which would not affect the WFD status of the element)	N/A	Not required. Upstream water body not impacted by Scheme.					
	16. Structure of riparian zone	-	-		N/A	N/A	N/A		N/A	N/A	N/A	• There is likely to be no net change to existing bank, riparian and floodplain structure and connectivity with channel due to the diversion	N/A	N/A	N/A	• The culvert would be smaller in the channel and in-channel flows may become deeper than natural peak flows, and may even cause a backwater effect upstream • Culvert would not be suitable for the transport of significant bed substrate or transport or scour, but bed structure could be homogenised • The

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Capper Lane Viaduct CFA22-SW-062					Swinfen Cutting		Impacts from other WFD water bodies (assessed separately)	OVERALL impact on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
	GB104028047020	Moderate	Good Ecological Status by 2027	Description of scheme element impact	Approximately 250m long viaduct over Capper Lane and disused Wyrley Essington canal with footings close to banks edge.					Cutting may interrupt groundwater flows and lead to the transfer of water from East Litchfield catchment to Black Bourne Brook catchment . Change will significantly affect the whole length of East Litchfield catchment, which is currently moderate due to abstraction.				Construction	Operation		
	East Litchfield catchment - tributary of Tame			Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.						
WFD classification elements	Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	-	-		Receptor is insensitive to impact	The footings will not be in the watercourse.	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. -There were no baseline macrophyte data available, however there would be a minor and highly localised effect on this minor tributary, which would not affect the status of this quality element.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- The water body does not currently have a WFD status for macrophytes and is no data were collected on macrophytes within the watercourse as part of the baseline surveys - Given that the likely loss in flow through the whole length of the catchment, it is possible that there will be a deterioration of the macrophyte WFD element.	Minor and localised effects, no change in WFD class of element.	No impacts from other WFD water bodies anticipated.	- The water body does not currently have a WFD status for macrophytes and is not known to be monitored for this element. - No data were collected on macrophytes within the watercourse as part of the baseline surveys - Although the scheme will lead to loss of habitat and photosynthetic activity (in shaded areas) on a minor tributary, this is relatively minor within the context of the water body. - It is possible that the changes to flow will lead to the deterioration of this WFD element, while other effects (e.g. due to a viaduct crossing on a minor tributary), will be minor and localised.	None required.	None required.	Potential widespread or prolonged adverse effects	-
	3. Macroinvertebrates	-	-		Receptor is insensitive to impact	As above	- Shading may have indirect effects on macroinvertebrates (if macrophyte cover is lost), but the overall effect is likely to be negligible.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- The water body does not currently have a WFD status for macroinvertebrates but data collected on macroinvertebrates within the watercourse as part of the baseline surveys indicated that macroinvertebrates present were indicative of good biological quality, but also indicative of sedimented conditions. - Given that the likely loss in flow through the whole length of the catchment, it is possible that there will be a deterioration of the macroinvertebrate WFD element.	Minor and localised effects, no change in WFD class of element.	No impacts from other WFD water bodies anticipated.	- The water body does not currently have a WFD status for macroinvertebrates and is not known to be monitored for this element. - Data collected on macroinvertebrates within the watercourse as part of the baseline surveys indicated that macroinvertebrates present in the affected tributary were indicative of good biological quality, but also indicative of sedimented conditions. - It is possible that the changes to flow will lead to the deterioration of this WFD element, while other effects (e.g. due to a viaduct crossing on a minor tributary), will be minor and localised.	None required.	None required.	Potential widespread or prolonged adverse effects	-
	4. Fish	-	-		Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). However, effects are likely to be temporary and localised with no impact on the water body as a whole.	As above	Shading will only have negligible or no effects on fish.	No likely effects anticipated.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- The water body does not currently have a WFD status for fish but baseline data collected on fish indicated only minor species were present, with limited fish habitat present. - Although there will a loss in flow, the fish community is relatively poor and tolerant to changes in flow. Therefore effects are considered to be minor and localised.	Minor and localised effects, no change in WFD class of element.	No impacts from other WFD water bodies anticipated.	- The water body does not currently have a WFD status for fish and is not known to be monitored for this element. It is not a designated cyprinid or salmonid river. - Baseline data collected on fish in the crossed tributary indicated only minor species were present, with limited fish habitat present. - The scheme may lead to temporary construction effects on a minor tributary and changes to flow. - It is possible that the changes to flow will lead to the deterioration of this WFD element, while other effects (e.g. due to a viaduct crossing on a minor tributary), will be minor and localised.	None required.	None required.	Potential widespread or prolonged adverse effects	-
	Physico-Chemical status																
WFD classification elements	5. Dissolved Oxygen	Good	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• Water quality could be reduced in the depleted reaches due to the reduced inflow of water and reduced flow rates, turbulence and oxygenation.	Minor and localised effects, no change in WFD class of element.	No impacts from other WFD water bodies anticipated.	Potential minor and localised effects on element.	None required.	None required.	Minor and localised effects	-
	6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No impacts from other WFD water bodies anticipated.	Receptor is insensitive to impact			No significant effects	-
	7. Phosphate	Bad	-		N/A	N/A	N/A	vely an open span bridge, so there would be	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, including phosphate from source and diffuse pollution.	Minor and localised effects, no change in WFD class of element.	No impacts from other WFD water bodies anticipated.	Depending on how much flow is lost, potential minor and localised effects on element. Five sewage discharge consents on tributaries of East Litchfield. The phosphate status cannot be deteriorated any further than 'Bad', therefore this effect will be presented in the prevention to future good status assessment.			Minor and localised effects	-
	8. Ammonia	Good	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Minor and localised effects, no change in WFD class of element.	No impacts from other WFD water bodies anticipated.	Potential minor and localised effects on element.			Minor and localised effects	-
	9. Temperature	High	-		N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	No impacts from other WFD water bodies anticipated.	Receptor is insensitive to impact			No significant effects	-
	10. Specific Pollutants (Annex VIII)	-	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• Water quality could be reduced in the depleted reaches due to relatively increased concentrations of resident contaminants, the reduced inflow of water and reduced flow rates, turbulence and oxygenation, and other possible effects	Minor and localised effects, no change in WFD class of element.	No impacts from other WFD water bodies anticipated.	Potential minor and localised effects on element.			Minor and localised effects	-
	Hydromorphological status																**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	• Potential reduction in channel flows for the whole length of East Litchfield catchment • Existing status is moderate partly due to abstraction • Further reduction of flows could be detrimental to hydrodynamics in terms of reduced flow rates and velocities, turbulence and mixing, water depths, wetted areas	N/A	No impacts from other WFD water bodies anticipated.	• Unlikely to be any impact from the viaduct which is effectively an open span bridge • The cutting could sever base flow to the whole East Litchfield watercourse, which would decrease flow rates with negative effects on hydrodynamics, sedimentation and wetted habitats • The available survey data suggest that the water body already has high rates of sedimentation, so if the cutting reduces groundwater inflows, any resultant impacts on hydromorphology could have significant impacts	Undertake hydromorphological surveys to aid detailed design development. Incorporate hydromorphological mitigation measures into detailed design where practicable. Mitigation measures might include: • Create low flow channels in over-widened/over-deepened channels • Create reed fringes • Creation of shallow margin in front of hard defence • Establish in-field sediment buffer strips • Implementation of SUDS • Retain marginal vegetation		• Decreased quantity and dynamics of flow	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A		N/A	• Cutting may decrease base flow base flow, with impacts to all hydromorphological properties	N/A	No impacts from other WFD water bodies anticipated.				• Reduced groundwater inflow	
	13. River continuity	-	-		N/A	N/A	N/A		N/A	• Hydraulic effects would be catchment wide. Combination of inevitable increase in sediment due to construction and reduced flows could be detrimental to bed habitat continuity and species migration	N/A	No impacts from other WFD water bodies anticipated.				• Decreased continuity	
	14. River depth and width variation bed	-	-		N/A	N/A	N/A		N/A	• Reduction of flows could decrease flow depth, wetted perimeter and hydraulic radius in a catchment that is already hydraulically modified	N/A	No impacts from other WFD water bodies anticipated.				• Decreased flow depths, and possible need to narrow base channel width as a result	
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A		N/A	• Decreased flow rates could increase sedimentation of bed habitats	N/A	No impacts from other WFD water bodies anticipated.				• Increased sedimentation	
	16. Structure of riparian zone	-	-		N/A	N/A	N/A		N/A	• Hydraulic connectivity with riparian zones could be decreased if flows are reduced	N/A	No impacts from other WFD water bodies anticipated.				• Reduced hydraulic connectivity to riparian zone	

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen														
None listed in RBMP. Reasons for failure include the following:	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-	-
A1a - Ammonia	-	-		-	-	-	-	-	-	-	-	No effect	-	-	No significant effects	-
P1a - Phosphate or Total Phosphate	-	-		-	-	-	-	-	-	-	-	No effect	-	-	No significant effects	-
HR4a - Hydrology (Abstraction	-	-		-	-	-	-	-	-	-	-	River diversions will be designed to replicate existing hydromorphological conditions and therefore the scheme is not considered to prevent implementation of future measures to address this failure	-	-	No significant effects	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Culvert - Fulfen Wood Culvert 184-S3					Culvert - Mare Brook No.1 Culvert 185-S3					Culvert - Fulfen Wood Culvert 184-S3					Impacts from other WFD water bodies (assessed separately) GB104028046440	OVERALL impact on element	Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB104028047050			Description of scheme element impact	*Tributary of Mare Brook at Birch Wood -Streethay culverted under scheme (CFA22-SWC-064), short re-alignment for culvert and balancing pond discharge for railway drainage, no further details available*					*Mare Brook culverted under railway embankment, short re-alignment for culvert*					*Tributary of Mare Brook at East Hill - Hillards (CFA22-SWC-067), culverted under scheme, short re-alignment for culvert and balancing pond discharge for railway drainage, no further details available no details available*									
River Tame Anker to Trent	Poor	Good by 2027	Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage			Construction	Operation		
WFD classification elements			Predicted change to status elements (green = none, amber = possibly, red = likely)																					
1.Macrophytes and phytobenthos - diatoms	N/A	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
2. Macrophytes and phytobenthos - macrophytes	Moderate	-		Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. - No macrophyte data available, however, only relatively short distance of the Mare Brook affected (not the main WFD water body) and there would be no conceivable effect on this element at a water body level. - Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the culvert).	- Shading of the channel from the culvert has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - There are no macrophyte data available, but there would only be a localised and minor effects on macrophyte communities, not affecting the status of this quality element.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert) may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediately downstream). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. - No macrophyte data available, however, only relatively short distance of the Mare Brook affected (not the main WFD water body) and there would be no conceivable effect on this element at a water body level. - Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the culvert).	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - There are no macrophyte data available, but there would only be a localised and minor effects on macrophyte communities, not affecting the status of this quality element.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert) may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediately downstream). - This would only be affect a limited distance of the watercourse and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macrophytes and reduce the availability of macrophyte habitats within the culvert. - Survey data show that some macrophytes are present in the watercourse, but only a relatively short distance of the minor tributary (which is effected) and there would be no conceivable effect on this element at a water body level. - Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the culvert).	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - There would only be a localised and minor effects on macrophyte communities, not affecting the status of this quality element.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert) may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediately downstream). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.		Culverts will lead to the direct loss of macroinvertebrates and habitats on tributary water bodies. However, the contribution of the tributaries to the overall water body is considered to be minor. Furthermore, there will be enhancements to the tributaries at the up and downstream ends of the culverts. Overall, the effect is considered to be minor and localised.	None required.	- Measures to improve macrophyte habitat or mitigate any adverse effects form part of the embedded mitigation measures described previously, therefore no additional measures are required. - These include channel habitat improvements to habitat downstream of around culverts - It is important to ensure that these potential beneficial effects are maximised during the detailed design of the specific elements. - Construction monitoring should be considered as part of the CEMP for sensitive water bodies	Minor and localised effects
3. Macroinvertebrates	Moderate	-		Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrates and reduce the habitats available for colonisation within the culvert. No baseline macroinvertebrate data were available, but nearby watercourses were of poor overall quality. - Given the relative contribution of this minor tributary and the overall water body community present, there would be no likely effect on this element at a water body level. - Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the culvert).	- Shading may have indirect effects on macroinvertebrates (if macrophyte cover is lost). These are likely to be negligible and within the context of the water body, with no anticipated effects on the wider water body.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert) may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediately downstream). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrates and reduce the habitats available for colonisation within the culvert. No baseline macroinvertebrate data were available. - Given the relative contribution of Mare Brook to the overall water body and short distance affected, there would be no likely effect on this element at a water body level. - Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the culvert).	- Shading may have indirect effects on macroinvertebrates (if macrophyte cover is lost). These are likely to be minor (at the very worst) and given the relative contribution of Mare Book to the River Tame, no anticipated effects on the wider water body are anticipated.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert) may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediately downstream). - This would only be affect a limited distance of the watercourse and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	Receptor is insensitive to impact	- Landtake will lead to direct loss of macroinvertebrates and reduce the habitats available for colonisation within the culvert. - Baseline data indicates that the invertebrate community present is very poor, impacted by poor water and heavily sedimented, with only highly tolerant species present. - Given that this is a very small tributary and the presence of the culvert have the potential to impede upstream passage of any migratory fish, the effects are likely impacts are likely to be temporally, low and highly localised, no measurable effects are anticipated.	- Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. - This would only be affect a limited distance of the watercourse and potential effects are considered to be minimal.	- Localised changes in flow dynamics (potential increased flow and scour due to the straightened channel in the culvert) may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediately downstream). - This would only be affect a limited distance of the minor tributary and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.		Culverts will lead to the direct loss of macroinvertebrate habitats on tributary water bodies. However, the contribution of the tributaries to the overall water body is considered to be minor. Furthermore, there will be enhancements to the tributaries at the up and downstream ends of the culverts. Overall, the effect is considered to be minor and localised.	None required.	- Measures to mitigate any adverse effects on fish form part of the embedded mitigation measures described previously. - These measures include channel improvements to habitat within the proximity of the culverts. - Although this tributary is not known to be of importance for migratory fish (no baseline habitat or fish data were collected) it is within the River Itchen, which is a designated salmonid fishery. It is important to ensure that the culvert is designed and installed to allow fish passage. An assessment of the culvert with relation to flows and fish passage must be included as part of the detailed design development. - Further surveys to assess the value of the tributary for fish should be undertaken as part of the assessment. Further construction and post construction monitoring should be considered (if necessary) to assess any effects on fish migration.	
4. Fish	Moderate	-		- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area) from habitat in the watercourse. However, effects are likely to be temporary and localised with no impact on the water body as a whole	- Landtake is unlikely to result in direct mortality of fish but there will be direct loss of fish habitats available for colonisation within the culvert. No fish or fish habitat data available, however plans indicate that only a short length of this minor tributary of the Tame will be effected with no conceivable effects on the water body as a whole - Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the culvert).	Shading will only have negligible or no effects on fish.	- Localised changes in flow dynamics (potential increased flow due to the straightened channel in the culvert), although tributary considered to have only minor contribution to overall water body. The culvert will be designed to avoid impacts on upstream passage of any migratory fish. - Effects are thus considered to be minor and localised.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). - Fish and fish habitat data indicate that Mare Brook at this location is very poor for fish, with only minor species present and very poor potential for fish. - Given that the species present aren't highly sensitive and the effects are likely impacts are likely to be temporally, low and highly localised, no measurable effects are anticipated	- Landtake is unlikely to result in direct mortality of fish but there will be direct loss of fish habitats available for colonisation within the culvert. - Fish and fish habitat data indicate that Mare Brook at this location is very poor for fish, with only minor species present and very poor potential for fish. The loss of habitat will be no conceivable effects on the water body as a whole - Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the culvert).	Shading will only have negligible or no effects on fish.	- Localised changes in flow dynamics (potential increased flow due to the straightened channel in the culvert) and the presence of the culvert have the potential to impede upstream passage of any migratory fish. - The size of the channel suggests that this area of Mare Brook is of low value for fish and the effects of this impact would only be minor and localised, with no likely effect on the fish population of the overall water body.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). - Fish and fish habitat data indicate that the tributary location is very poor, with only minor species present and very poor potential for fish. The loss of habitat will only lead to very minor and localised effects, with no conceivable effects on the water body as a whole - Embedded measures that are proposed will provide some mitigation on this element (notably improvements along watercourse either side of the culvert).	Shading will only have negligible or no effects on fish.	- Localised changes in flow dynamics (potential increased flow due to the straightened channel in the culvert) may result in changes to macroinvertebrate communities within the immediate vicinity of the culvert (notably in immediately downstream). - This would only be affect a limited distance of the watercourse and potential effects are considered to be minimal.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated change in water quality.		Culverts will lead to the direct loss of macroinvertebrate habitats on tributary water bodies. However, the contribution of the tributaries to the overall water body is considered to be minor. Furthermore, there will be enhancements to the tributaries at the up and downstream ends of the culverts. Overall, the effect is considered to be minor and localised.	None required.	- Measures to mitigate any adverse effects on fish form part of the embedded mitigation measures described previously. - These measures include channel improvements to habitat within the proximity of the culverts. - Although this tributary is not known to be of importance for migratory fish (no baseline habitat or fish data were collected) it is within the River Itchen, which is a designated salmonid fishery. It is important to ensure that the culvert is designed and installed to allow fish passage. An assessment of the culvert with relation to flows and fish passage must be included as part of the detailed design development. - Further surveys to assess the value of the tributary for fish should be undertaken as part of the assessment. Further construction and post construction monitoring should be considered (if necessary) to assess any effects on fish migration.	
Physico-Chemical status																								
WFD classification elements	5. Dissolved Oxygen	Good	-		N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.						
	6. pH	High	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact						
	7. Phosphate	Bad	-		N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact						
	8. Ammonia	Good	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact						
	9. Temperature	-	-		N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culvert, there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Due to the length of the culverts there is likely to be a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact						
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.						
Hydromorphological status																								**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-		N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • Tributary of Mare Brook at Birch Wood is effectively a drainage ditch within the catchment of the WFD water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • Tributary of Mare Brook at East Hill - Hillards is effectively a drainage ditch within the catchment of the WFD water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth compared to natural banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness. • This tributary of Mare Brook at East Hill - Hillards is effectively a drainage ditch within the catchment of the WFD water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	• Given the degree of hydromorphological impacts at water body scale upstream, it is highly unlikely that hydromorphological effects would cascade to connecting water bodies, especially if mitigation measures are put in place 'at source'.	• Although there may be small changes in homogenised flow patterns and increased flow velocities due to increased channel gradients and decreased roughness, it is unlikely that there will be significant impacts predicted on the hydromorphology of the watercourse due to the size of the watercourse and the culverts would impact a small proportion of the water body. The three culverts are on separate tributaries so although there will inevitably be cumulative effects, there are not likely to be severe impacts on any single watercourse and the effects at water body scale are not likely to be significant.	None required.	None required.	No significant impacts predicted	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A						
	13. River continuity	-	-		N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel, • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel, • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel, • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A						
	14. River depth and width variation	-	-		N/A	N/A	N/A	• Out of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A	N/A	N/A	N/A	• Out of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A	N/A	N/A	N/A	• Out of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme events • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A						
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• The size of the channel means that there is unlikely to be significant bed substrate or transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	N/A	N/A	N/A	• The size of the channel suggests that there is unlikely to be significant bed substrate or transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A						
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A						

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	Predicted change to status elements (green = none, amber = possibly, red = likely)																					
NONE	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Viaduct - Cappers Lane Viaduct (footings in or within riparian zone of watercourse)					Cutting and viaducts GW/SW interaction - Whittington Common cutting and Streethay viaduct		Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	-
	GB70910212	Good	Good Ecological Potential by 2015	Description of scheme element impact	Cappers Lane Viaduct - Canal Tunnel (disused) Wryley and Essington Canal at Cappers Lane) connected to Coventry and Ashby Canals (active and <50m away)					Cuttings and scheme elements in vicinity of Coventry and Ashby canal - receptor assessed as unlikely to be groundwater dependent.							
	Coventry and Ashby Canals			Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Changes (i.e. either decrease due to de-watering/damming of groundwater flows or increase due to re-charge) in flow velocity and volume due to de-watering	Change in water quality due to discharge of groundwater to a surface water body.			Construction	Operation		
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	-	-		- Receptor is insensitive to impact.	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats.	- Baseline surveys indicate limited channel macrophyte communities in the canal. - There may be minor changes in the cover and composition of macrophyte communities, but this is not considered to be greater than a minor localised change.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	No effects anticipated	No effects anticipated	None identified	Only minor and localised effects anticipated, no effect on WFD element	None required.	None required.	N/A	-
	3. Macroinvertebrates	-	-		- Receptor is insensitive to impact.	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats which may be important for macroinvertebrates.	- Macroinvertebrate community (no baseline data available) may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality .	No effects anticipated	No effects anticipated	None identified	Only minor and localised effects anticipated, no effect on WFD element	None required.	None required.	N/A	-
	4. Fish	-	-		- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). - There were no baseline fish surveys, but fish habitat assessment indicated poor fish habitat quality in the canal. - Effects are likely to be temporary and localised.	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats.	- No likely effects on fish.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	No effects anticipated	No effects anticipated	None identified	Only minor and localised effects anticipated, no effect on WFD element	None required.	None required.	N/A	-
	Physico-Chemical status																
WFD classification elements	5. Dissolved Oxygen	Good	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	No effects anticipated	No effects anticipated	None identified	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	N/A	-
	6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No effects anticipated	No effects anticipated	None identified					-
	7. Phosphate	High	-		N/A	N/A	N/A	n is effectively an open span bridge, so there would be no impac	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	No effects anticipated	No effects anticipated	None identified					-
	8. Ammonia	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	No effects anticipated	No effects anticipated	None identified					-
	9. Temperature	-	-		N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	No effects anticipated	No effects anticipated	None identified					-
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	No effects anticipated	No effects anticipated	None identified					-
	Hydromorphological status																**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	No effects on hydromorphology anticipates, due to insignificant changes in hydromorphological regime.	N/A	N/A	N/A	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A		N/A	N/A		
	13. River continuity	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A		N/A	N/A		
	14. River depth and width variation bed	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A		N/A	N/A		
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A		N/A	N/A		
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A	No anticipated effects, due to insignificant changes in hydromorphological regime.	No anticipated effects, due to insignificant changes in hydromorphological regime.	N/A		N/A	N/A		

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manage disturbance	-	In Place	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Possible minor/localised effects.	N/A	N/A	N/A	N/A
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone	-	In Place		Some loss of bankside habitat due to construction of viaduct					N/A	N/A	N/A	Some loss of bankside habitat due to construction of viaduct	None required.	None required.	N/A	N/A
Avoid the need to dredge (e.g. minimise under-keel clearance; use fluid mud navigation; flow manipulation or training works)	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Prepare a dredging / disposal strategy	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Reduce impact of dredging	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Reduce sediment resuspension	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Alter timing of dredging / disposal	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bank rehabilitation / reprofiling	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Possible localised effects (footings near to banks at viaduct)	None required.	None required.	N/A	N/A
Site selection (dredged material disposal) (e.g. avoid sensitive sites)	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Awareness raising / information boards (boat wash / sources of fine sediment)	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Phased de-watering and other techniques	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Selective vegetation control regime	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Appropriate vegetation control technique	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Appropriate timing (vegetation control)	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Appropriate techniques (invasive species)	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Modify vessel design	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vessel Management	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sediment management	-	In Place		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Viaduct - Pyford Brook Viaducts (footings in or within riparian zone of watercourse)					Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
	GB104028047250	Moderate	Good Ecological Potential by 2027	Description of scheme element impact	*Pyford Brook crossing at Wood End Lane (CFA22-SWC-070). Construction of viaducts and footings and retaining structure within riparian area. Viaduct length 95m and between 14.75m and 11.75m above ground level.*							Construction	Operation		
	Pyford Brook Catchment (tributary of Trent)			Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms			Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	2. Macrophytes and phytobenthos - macrophytes	Good	-		- Receptor is insensitive to impact.	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats.	Baseline data not available within the vicinity of the crossing. There may be loss of macrophytes within the at the location of the viaduct because of shading, but this will be minor and localised.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	No affected upstream water body.	Only possible effects identified are temporary, localised and/or minor	None required.	None required.	Minor and localised effects	-
	3. Macroinvertebrates	Bad	-		- Receptor is insensitive to impact.	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats which may be important for macroinvertebrates.	Very poor macroinvertebrate community within the area, not likely to be sensitive to any changes in macrophyte cover.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	No affected upstream water body.	No effects identified.	None required.	None required.	No significant effects	-
	4. Fish	-	-		- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). - Baseline data indicated moderate fish habitat and the presence of mostly minor species in this section of the river. - Effects are likely to be temporary and localised.	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats.	Fish may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	No affected upstream water body.	Only possible effects identified are temporary, localised and/or minor	None required.	None required.	Minor and localised effects	-
	Physico-Chemical status														
WFD classification elements	5. Dissolved Oxygen	Bad	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	Upstream water body not impacted by scheme	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	No significant effects	-
	6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream water body not impacted by scheme					
	7. Phosphate	Bad	-		N/A	N/A	N/A	• Crossing design is effectively an open span bridge, so there would be no impact on Phosphate.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	Upstream water body not impacted by scheme					
	8. Ammonia	Bad	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream water body not impacted by scheme					
	9. Temperature	-	-		N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream water body not impacted by scheme					
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	Upstream water body not impacted by scheme					
	Hydromorphological status														**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• Pyford Brook Viaduct crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	Upstream water body not impacted by scheme	Footings in riparian zones or floodplains could cause some local turbulence at flood flows, however, unlikely to be hydromorphological impacts.	None required.	None required.	No significant effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A		N/A	Upstream water body not impacted by scheme					
	13. River continuity	-	-		N/A	N/A	N/A		N/A	Upstream water body not impacted by scheme					
	14. River depth and width variation bed	-	-		N/A	N/A	N/A		N/A	Upstream water body not impacted by scheme					
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A		N/A	Upstream water body not impacted by scheme					
	16. Structure of riparian zone	-	-		N/A	N/A	N/A		N/A	Upstream water body not impacted by scheme					

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen											
Retain marginal aquatic and riparian habitats (channel alteration)	-	In Place	Predicted change to status elements (green = none, amber = possibly, red = likely)	Minor loss of riparian habitat near viaduct.					-	Minor loss of riparian habitat near viaduct.	None required.	None required.	Minor and localised effects	-
Educate landowners on sensitive management practices (urbanisation)	-	Not In Place		-	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated		-	No impact on this objective.	None required.	None required.	No significant effects	-
Increase in-channel morphological diversity	-	Not In Place		-	-	-			-	No impact on this objective.	None required.	None required.	No significant effects	-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Viaduct - Bourne Brook Viaduct (footings in or within riparian zone of watercourse)					Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
	GB104028047270	Good	Good Ecological Status by 2015	Description of scheme element impact	Construction of Bourne Brook viaduct at CFA22-SWC-072 with watercourse enhancements. 150m in length with maximum height of 13.95m above ground. Not river diversion apparent although in channel works as watercourse will receive drainage from balancing pond.							Construction	Operation		
	Bourne-Bilson Brook Catchment (tributary of Trent)			Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-
	2. Macrophytes and phytobenthos - macrophytes	-	-		- Receptor is insensitive to impact.	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats.	Baseline data indicate very limited macrophyte cover in the area due to shading from trees. Therefore shading from the viaduct will have no likely effects on macrophytes in this section.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	No affected upstream water body.	No effects identified.	None required.	None required.	No significant effects	-
	3. Macroinvertebrates	Good	-		- Receptor is insensitive to impact.	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats which may be important for macroinvertebrates.	No anticipated effects.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	No affected upstream water body.	No effects identified.	None required.	None required.	No significant effects	-
	4. Fish	-	-		- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). - Baseline data indicated moderate fish habitat and the presence of salmonids in this section of the river. - Effects are likely to be temporary and localised.	Viaduct footings will be close to river bank, but will not result in the loss of marginal or channel habitats.	No anticipated effects.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	No affected upstream water body.	Only possible effects identified are temporary, localised and minor	None required.	None required.	Minor and localised effects	-
	Physico-Chemical status														
WFD classification elements	5. Dissolved Oxygen	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an	Upstream water body not impacted by scheme	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	No significant effects	-
	6. pH	-	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream water body not impacted by scheme					
	7. Phosphate	-	-		N/A	N/A	N/A	• Crossing design is effectively an open span bridge, so there would be no impact on Phosphate.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an	Upstream water body not impacted by scheme					
	8. Ammonia	-	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream water body not impacted by scheme					
	9. Temperature	-	-		N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	Upstream water body not impacted by scheme					
	10. Specific Pollutants (Annex VIII)	-	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an	Upstream water body not impacted by scheme					
	Hydromorphological status														Hydromorphology Baseline
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change that could mean that the river erodes against viaduct footings • Overall, there would probably be no hydromorphological impact	N/A	Upstream water body not impacted by scheme	• Footings in riparian zones or floodplains could cause some local turbulence at flood flows, but would not considered to be significant	None required.	None required.	No significant effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A		N/A	Upstream water body not impacted by scheme					
	13. River continuity	-	-		N/A	N/A	N/A		N/A	Upstream water body not impacted by scheme					
	14. River depth and width variation bed	-	-		N/A	N/A	N/A		N/A	Upstream water body not impacted by scheme					
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A		N/A	Upstream water body not impacted by scheme					
	16. Structure of riparian zone	-	-		N/A	N/A	N/A		N/A	Upstream water body not impacted by scheme					

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen	-	-	-	-	-	-	-	-	-	-	-	-
NONE in RBMP Annex B	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Viaduct - Harveys Rough Viaduct (footings in or within riparian zone of watercourse)					River Diversion - Assumed watercourse realignment on Tributary of River Trent at Ashton Hays			Culvert - Tributary of River Trent at Harveys Rough					Culvert - Tributary of River Trent at Ashton Hays				
GB104028047290			Description of scheme element impact	*Viaduct will carry HS2 over proposed realignment of West Cost Main Lane. Crosses Drain at Harveys Rough ('Show Lane Farm (CFA22-SWC-074) - length approximately 100m.*					*Assumed watercourse realignment during culverting on tributary of River Trent at Ashton Hays (CFA22-SWC-076)*			*Culverting of Tributary of River Trent at Harveys Rough (CFA22-SWC-075).*					*Culverting of Tributary of River Trent at Ashton Hays (CFA22-SWC-076). Assumed watercourse realignment (as noted in ES Vol 5).*				
River Trent from Moreton Brook to River Tame	Poor	God Ecological Potential by 2027	Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Landtake	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Creation of new habitats	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage
WFD classification elements	**1.Macrophytes and phytobenthos - diatoms**	N/A	N/A	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2. Macrophytes and phytobenthos - macrophytes	Moderate	-		Receptor is insensitive to impact	Limited information available on the location of the bridge footings, however, given the small size of the watercourse it is more likely that it will be diverted to avoid any footings, if necessary. Therefore the only impact will be temporary landtake during construction and until the new channel and habitats establish. The effect on macrophytes would be minor, temporary and localised with no conceivable effect on the status of this element.	Shading of the channel from the viaduct has the potential to reduce photosynthetic activity and therefore affect macrophyte communities present. There were no baseline macrophyte data available, however there would be a minor and highly localised effect on the watercourse, which would not affect the status of this quality element.	No likely effects anticipated on this element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated effect on macrophytes.	Temporary loss of limited length of watercourse and macrophytes the existing tributary of the River Trent. No baseline data available locally for macrophytes. By default, and given the small contribution of the tributary (drainage ditch) to the River Trent, potential temporary adverse effect considered to be only localised and minor.	No significant effect anticipated.	The new channel will incorporate marginal berms to encourage emergent macrophyte species and the channel will include a range of habitats suitable for colonisation by submerged species, excepted within the culverted area. No baseline data available locally for macrophytes. By default, potential localised beneficial effect anticipated.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to loss of limited length of macrophyte habitat in the tributary of the River Trent. No baseline data available locally for macrophytes. By default, and given the small contribution of the tributary (drainage ditch) to the River Trent, potential adverse effect considered to be only localised and minor.	Likely to lead to the loss of macrophytes, due to reduction in photosynthetic activity on the tributary of the River Trent. No baseline data available. By default, and given the small contribution of the tributary (drainage ditch) to the River Trent, potential adverse effect considered to be only localised and minor.	Potential homogenised flow patterns and increase in flow velocities locally, with no significant effect at the scale of the water body. Although no baseline data is available, given the small contribution of the tributary (drainage ditch) to the River Trent, potential adverse effect considered to be only localised and minor.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated effect on macrophytes.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to loss of limited length of watercourse and of macrophyte habitat on the tributary of the River Trent. No baseline data available locally for macrophytes. By default, and given the small contribution of the tributary (drainage ditch) to the River Trent, potential adverse effect considered to be only localised and minor.	Likely to lead to the loss of macrophytes, due to reduction in photosynthetic activity on tributary of the River Trent. No baseline data is available . By default, and given the small contribution of the tributary (drainage ditch) to the River Trent, potential adverse effect considered to be only localised and minor.	Potential homogenised flow patterns and increase in flow velocities locally, with no significant effect at the scale of the water body. Although no baseline data is available, given the small contribution of the tributary (drainage ditch) to the River Trent, potential adverse effect considered to be only localised and minor.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated effect on macrophytes.
	3. Macroinvertebrates	Moderate	-		Receptor is insensitive to impact	As above	Shading may have indirect effects on macroinvertebrates (if macrophytes are affected). There were no baseline macroinvertebrate data available, but the overall effect is likely to be negligible.	No likely effects anticipated on this element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated effect on macroinvertebrates.	Temporary loss of limited length of watercourse and macroinvertebrate habitat within the new channel. No baseline data available locally for fish. By default, and given the small contribution of the tributary (drainage ditch) to the River Trent, potential temporary adverse effect considered to be only localised and minor.	No significant effect anticipated.	The river diversion will be designed to include a range of channel habitats, including where possible pools, riffles and runs in order to allow for colonisation by the range of invertebrate taxa that currently characterise the reach, excepted within the culverted area. No baseline data available locally for macrophytes. By default, potential localised beneficial effect anticipated.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to permanent loss of limited length of macroinvertebrate habitat (i.e. substrate, riparian vegetation, aquatic macrophytes) on the tributary of the River Trent. No baseline data available locally. By default, and given the small contribution of the tributary (drainage ditch) to the River Trent, potential adverse effect considered to be only localised and minor.	No additional effect anticipated (loss of vegetation already included in the landtake impact), locally or at the scale of the water body.	Potential homogenised flow patterns and increase in flow velocities locally, with no significant effect at the scale of the water body. Although no baseline data is available, given the small contribution of the tributary (drainage ditch) to the River Trent, potential adverse effect considered to be only localised and minor.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated effect on macroinvertebrates.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to loss of limited length of watercourse and macroinvertebrate habitat (i.e. substrate, riparian vegetation, aquatic macrophytes) on the tributary of the River Trent. No baseline data available locally. By default, and given the small contribution of the tributary (drainage ditch) to the River Trent, potential adverse effect considered to be only localised and minor.	No additional effect anticipated (loss of vegetation already included in the landtake impact), locally or at the scale of the water body.	Potential homogenised flow patterns and increase in flow velocities locally, with no significant effect at the scale of the water body. Although no baseline data is available, given the small contribution of the tributary (drainage ditch) to the River Trent, potential adverse effect considered to be only localised and minor.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated effect on macroinvertebrates.
	4. Fish	Moderate	-		Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). However, effects are likely to be temporary and localised.	As above	Shading will only have negligible or no effects on fish.	No likely effects anticipated on this element.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. There is no anticipated effect on fish.	Temporary loss of limited length of watercourse and fish habitat within the tributary of the River Trent. No baseline data available locally for fish. By default, and given the small contribution of the tributary (drainage ditch) to the River Trent, potential temporary adverse effect considered to be only localised and minor.	No significant effect anticipated.	The range of habitats incorporated into the diverted channel is considered to represent an improvement on the current habitat. No data available. By default, potential localised beneficial effect anticipated.	Localised and temporary adverse effect during construction. No deterioration of the water body status of the element is however expected.	Likely to lead to permanent loss of limited length of fish habitat (i.e. substrate, riparian vegetation, marginal aquatic macrophytes) on the tributary of the River Trent. Culvert may also to constitute an obstruction to fish movements. No baseline data available on the tributary but the River Trent is a designated fisheries (Freshwater Fish Directive). Despite the absence of information on the value of the tributary for fish (i.e. potential spawning areas), as the culvert is located at the very upstream end of this tributary, only localised adverse effects anticipated.	No additional effect anticipated (loss of vegetation already included in the landtake impact), locally or at the scale of the water body.	Potential homogenised flow patterns and increase in flow velocities locally, with no significant effect at the scale of the water body. Although no baseline data is available, given the small contribution of the tributary (drainage ditch) to the River Trent, potential adverse effect considered to be only localised and minor.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated effect on fish.	Localised and temporary adverse effect during construction. No deterioration of the water body status of the element is however expected.	Likely to lead to loss of limited length of watercourse and fish habitat (i.e. substrate, riparian vegetation, marginal aquatic macrophytes) on tributary of the River Trent. Culvert also to constitute obstruction to fish movements. No baseline data available on the tributary but the River Trent is a designated fisheries (Freshwater Fish Directive). Despite the absence of information on the value of the tributary for fish (i.e. potential spawning areas), as the culvert is located at the very upstream end of this tributary, only localised adverse effects anticipated.	No additional effect anticipated (loss of vegetation already included in the landtake impact), locally or at the scale of the water body.	Potential homogenised flow patterns and increase in flow velocities locally, with no significant effect at the scale of the water body. Although no baseline data is available, given the small contribution of the tributary (drainage ditch) to the River Trent, potential adverse effect considered to be only localised and minor.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated effect on fish.
	Physico-Chemical status																				
WFD classification elements	**5. Dissolved Oxygen**	Good	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	• Release of sediment during construction of new channel and changes in river processes may cause a temporary drop in dissolved oxygen. This impact is likely to be temporary/local in relation to the water body.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Nature of sediment during construction of new channel and changes in river processes.	N/A	N/A	Proposed culvert extension is likely to have a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Proposed culvert extension is likely to have a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
	6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	7. Phosphate	Poor	-		N/A	N/A	N/A	ge is effectively an open span bridge, so there would be no impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Release of sediment during construction of new channel and changes	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact
	8. Ammonia	Good	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact
	9. Temperature	-	-		N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Proposed culvert extension is likely to have a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Proposed culvert extension is likely to have a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.
	Hydromorphological status																				
WFD classification elements	**11. Quantity and dynamics of river flow**	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• Crossing is effectively an open span bridge, and comparison with historic maps suggests that there has been no significant planform change that could mean that the bridge erodes against viaduct footings. • Overall, there would probably be no hydromorphological impact	N/A	N/A	• Channel width appears to be 2m or less, so there is unlikely to be significant diversity of flow dynamics • Tributary of River Trent at Ashton Hayis is a minor tributary and in practical terms represents a small proportion of the water body • Lengthening the channel may reduce flow rates although the diversion is not far from the existing channel line • Overall, it is considered that the impacts on flow dynamics are unlikely to be measurable, but the effect of lengthening the watercourse still needs to be flagged as a risk	• The extent of new watercourse that would be created, and the possible negative effects of altering existing channel conditions, mean that there would be no significant habitat creation	N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth concrete, with no marginal banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and channel roughness. • The tributary of the River Trent at Harveys Rough is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth concrete, with no marginal banks and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and channel roughness. • The tributary of the River Trent at Ashton Hayis is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A
	12. Connection to Groundwater	-	-		N/A	N/A	N/A		N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A
	13. River continuity	-	-		N/A	N/A	N/A		N/A	N/A	• Lengthening the channel may result in increased channel storage and reduced floodplain connectivity, but the size of the watercourse and the extent of the diversion mean that continuity is unlikely to be significantly affected		N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in water body terms, this is a minor feature and the culvert would not impact on the overall water body status.	N/A	N/A	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in water body terms, this is a minor feature and the culvert would not impact on the overall water body status.	N/A
	14. River depth and width variation bed	-	-		N/A	N/A	N/A		N/A	N/A	• The diversion would replicate existing channel geometry. Out of channel flow depths may decrease as a result of lengthening the channel, but in practical terms there would be no significant change		N/A	N/A	N/A	• Out of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in some instances. • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A	N/A	N/A	N/A	• Out of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in some instances. • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A		N/A	N/A	• Lengthening a channel tends to reduce flow rates and increase deposition of sediment • Given the size of the watercourse there would probably be no measurable impact		N/A	N/A	N/A	• THe size of the channel suggests that there would be no significant loss of substrate or transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A	N/A	N/A	N/A	• The size of the channel suggests that there would be no significant loss of substrate or transport or scour • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk	N/A
	16. Structure of riparian zone	-	-		N/A	N/A	N/A		N/A	N/A	• Although channel capacity would increase, there is likely to be no net change to existing bank, riparian and floodplain structure and connectivity with channel		N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	**Before RBMP measure will happen**	**Before RBMP measure will happen**																			
Manage disturbance	-	In Place	Predicted change to status elements (green = none, amber = possibly, red = likely)	-	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-	-	-	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone.	-	In Place		-	-	-		-	-			-	-	-	• Nature of impact means that opportunities to implement these measures could be limited in this particular section of the tributary, but overall, the impact on this tributary is unlikely to inhibit future implementation of measures at water body scale	-	-	-	-	-	• Nature of impact means that opportunities to implement these measures could be limited in this particular section of the tributary, but overall, the impact on this tributary is unlikely to inhibit future implementation of measures at water body scale	-
Avoid the need to dredge (e.g. minimise under-keel clearance; use fluid mud navigation; flow manipulation or training works)	-	In Place		-	-	-		-	-			-	-	-		-	-	-	-	-		-
Prepare a dredging / disposal strategy	-	In Place		-	-	-		-	-			-	-	-		-	-	-	-	-		-
Reduce impact of dredging	-	In Place		-	-	-		-	-			-	-	-		-	-	-	-	-		-
Reduce sediment resuspension	-	In Place		-	-	-		-	-			-	-	-		-	-	-	-	-		-
Alter timing of dredging / disposal	-	In Place		-	-	-		-	-			-	-	-		-	-	-	-	-		-
Bank rehabilitation / reprofiling	-	In Place		-	-	-		-	-			-	-	-		-	-	-	-	-		-
Site selection (dredged material disposal) (e.g. avoid sensitive sites)	-	In Place		-	-	-		-	-			-	-	-		-	-	-	-	-		-
Awareness raising / information boards (boat wash / sources of fine sediment)	-	In Place		-	-	-		-	-			-	-	-		-	-	-	-	-		-
Phased de-watering and other techniques	-	In Place		-	-	-		-	-			-	-	-		-	-	-	-	-		-
Selective vegetation control regime	-	In Place		-	-	-		-	-			-	-	-		-	-	-	-	-		-
Appropriate vegetation control technique	-	In Place		-	-	-		-	-			-	-	-		-	-	-	-	-		-
Appropriate timing (vegetation control)	-	In Place		-	-	-		-	-			-	-	-		-	-	-	-	-		-
Appropriate techniques (invasive species)	-	In Place		-	-	-		-	-			-	-	-		-	-	-	-	-		-
Modify vessel design	-	In Place		-	-	-		-	-			-	-	-		-	-	-	-	-		-
Vessel Management	-	In Place		-	-	-		-	-			-	-	-		-	-	-	-	-		-
Sediment management	-	In Place		-	-	-		-	-			-	-	-		-	-	-	-	-		-

A. Risk screening of potential to cause deterioration of current WFD Ecological status

	Surface Water body	Current status	Status objective	Scheme Elements	Culvert - Tributary of River Trent at Lichfield Road (BS014)					Culvert - Tributary of River Trent at White Gables					Impacts from other WFD water bodies (assessed separately) - GB104028047250 (Pyford Brook Catchment (tributary of Trent)) and GB104028047270 (Bourne-Bilson Brook Catchment (tributary of Trent))	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
	GB104028047290			Description of scheme element impact	*Culverting of Tributary of River Trent at Lichfield Road (BS014) (CFA22-SWC-077). Construction of two culverts named Handsacre culvert east and Handsacre culvert no.1 with in channel construction work.*					*Culverting of tributary of River Trent at White Gables (CFA22-SWC-078) called Handsacre Culvert West receiving drainage outfall from railway.*								Construction	Operation		
	River Trent from Moreton Brook to River Tame	Poor	God Ecological Potential by 2027	Identified biological impacts	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage						
WFD classification elements	1.Macrophytes and phytobenthos - diatoms	N/A	N/A	Predicted change to status element(s) (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
	2. Macrophytes and phytobenthos - macrophytes	Moderate	-		Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to loss of limited length of watercourse and macrophyte habitat on the tributary of the River Trent. No baseline data available locally on macrophytes so these watercourses. By default, and given the small contribution of the tributary (drainage ditch) to the River Trent, potential adverse effect considered to be only localised and minor.	Likely to lead to the loss of macrophytes, due to reduction in photosynthetic activity on tributary of the River Trent. No baseline data available. By default, and given the small contribution of the tributary (drainage ditch) to the River Trent, potential adverse effect considered to be only localised and minor.	Potential homogenised flow patterns and increase in flow velocities locally, with no significant effect at the scale of the water body. Although, no baseline data is available, given the small contribution of the tributary (drainage ditch) to the River Trent, potential adverse effect considered to be only localised and minor.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to loss of limited length of watercourse and macrophyte habitat on the tributary of the River Trent. No baseline data available locally on macrophytes. By default, and given the small contribution of the tributary (drainage ditch) to the River Trent, potential adverse effect considered to be only localised and minor.	Likely to lead to the loss of macrophytes, due to reduction in photosynthetic activity on tributary of the River Trent. No baseline data available. By default, and given the small contribution of the tributary (drainage ditch) to the River Trent, potential adverse effect considered to be only localised and minor.	Potential homogenised flow patterns and increase in flow velocities locally, with no significant effect at the scale of the water body. Although, no baseline data is available, given the small contribution of the tributary (drainage ditch) to the River Trent, potential adverse effect considered to be only localised and minor.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Scheme elements present on the upstream water bodies are viaducts and therefore considered to have only very localised adverse effects. No effect anticipated on this quality element.	Scheme elements (culverts and short-realignments) present on this water body are only located on minor tributaries (drainage ditches) of the River Trent. Potential adverse effects are likely to be very localised and minor at the scale of the water body. Therefore, the scheme is considered as unlikely to lead to a deterioration of the current WFD status (Moderate) of this quality element.	No additional mitigation required	No additional mitigation required	Localised and minor effects	
	3. Macroinvertebrates	Moderate	-		Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to loss of limited length of watercourse and macroinvertebrates habitat (i.e. substrate, riparian vegetation, aquatic macrophytes) on the tributary of the River Trent. No baseline data available locally. By default, and given the small contribution of the tributary (drainage ditch) to the River Trent, potential adverse effect considered to be only localised and minor.	No additional effect anticipated (loss of vegetation already included in the landtake impact), locally or at the scale of the water body.	Potential homogenised flow patterns and increase in flow velocities locally, with no significant effect at the scale of the water body. Although no baseline data is available, given the small contribution of the tributary (drainage ditch) to the River Trent, potential adverse effect considered to be only localised and minor.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Receptor not sensitive to impact. No likely effect anticipated.	Likely to lead to loss of limited length of watercourse and macroinvertebrates habitat (i.e. substrate, riparian vegetation, aquatic macrophytes) on the tributary of the River Trent. No baseline data available locally. By default, and given the small contribution of the tributary (drainage ditch) to the River Trent, potential adverse effect considered to be only localised and minor.	No additional effect anticipated (loss of vegetation already included in the landtake impact), locally or at the scale of the water body.	Potential homogenised flow patterns and increase in flow velocities locally, with no significant effect at the scale of the water body. Although no baseline data is available, given the small contribution of the tributary (drainage ditch) to the River Trent, potential adverse effect considered to be only localised and minor.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Scheme elements present on the upstream water bodies are viaducts and therefore considered to have only very localised adverse effects. No effect anticipated on this quality element.	Scheme elements (culverts and short-realignments) present on this water body are only located on minor tributaries (drainage ditches) of the River Trent. Potential adverse effects are likely to be very localised and minor at the scale of the water body. Therefore, the scheme is considered as unlikely to lead to a deterioration of the current WFD status (Moderate) of this quality element.	No additional mitigation required	No additional mitigation required	Minor and localised effects	
	4. Fish	Moderate	-		Localised and temporary adverse effect during construction. No deterioration of the water body status of the element is however expected.	Likely to lead to loss of limited length of watercourse and fish habitat (i.e. substrate, riparian vegetation, marginal aquatic macrophytes) on tributary of the River Trent. Culvert also to constitute obstruction to fish movements. No baseline data available on the tributary but the River Trent is a designated fisheries (Freshwater Fish Directive). Despite the absence of information on the value of the tributary for fish (i.e. potential spawning area), as the culvert is located at the very upstream end of this tributary, only localised adverse effects anticipated.	No additional effect anticipated (loss of vegetation already included in the landtake impact), locally or at the scale of the water body.	Potential homogenised flow patterns and increase in flow velocities locally, with no significant effect at the scale of the water body. Although no baseline data is available, given the small contribution of the tributary (drainage ditch) to the River Trent, potential adverse effect considered to be only localised and minor.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Localised and temporary adverse effect during construction. No deterioration of the water body status of the element is however expected.	Likely to lead to loss of limited length of watercourse and fish habitat (i.e. substrate, riparian vegetation, marginal aquatic macrophytes) on the tributary of the River Trent. Culvert also to constitute obstructions to fish movements. No baseline data available on the tributary but the River Trent is a designated fisheries (Freshwater Fish Directive). Despite the absence of information on the value of the tributary for fish (i.e. potential spawning area), as the culvert is located at the very upstream end of this tributary, only localised adverse effects anticipated.	No additional effect anticipated (loss of vegetation already included in the landtake impact), locally or at the scale of the water body.	Potential homogenised flow patterns and increase in flow velocities locally, with no significant effect at the scale of the water body. Although no baseline data is available, given the small contribution of the tributary (drainage ditch) to the River Trent, potential adverse effect considered to be only localised and minor.	Drainage (including balancing ponds) has been designed to reduce the rate and volume of run-off from the proposed railway. No anticipated change in water quality.	Scheme elements present on the upstream water bodies are viaducts and therefore considered to have only very localised adverse effects. No effect anticipated on this quality element.	Scheme elements (culverts and short-realignments) present on this water body are only located on minor tributaries (drainage ditches) of the River Trent, and are considered as not having an effect at the scale of the water body. Therefore, the scheme is not considered to have the potential to lead to a deterioration of the current WFD status (Moderate) of this quality element.	No additional mitigation required	No additional mitigation required	The scheme is considered to have the potential to lead to a deterioration of the current WFD status (Moderate) of this quality element.	
	Physico-Chemical status																			
WFD classification elements	5. Dissolved Oxygen	Good	-	Predicted change to status element(s) (green = none, amber = possibly, red = likely)	N/A	N/A	Proposed culvert extension is likely to have a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Proposed culvert extension is likely to have a minor impact on dissolved oxygen. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Scheme elements present on the upstream water bodies are viaducts and therefore considered to have only very localised adverse effects. No effect anticipated on this quality element.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are considered temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on water quality during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourse) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	No additional mitigation required	No additional mitigation required	Minor and localised effects	
	6. pH	High	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Scheme elements present on the upstream water bodies are viaducts and therefore considered to have only very localised adverse effects. No effect anticipated on this quality element.					
	7. Phosphate	Poor	-		N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to *minor* impacts with negligible effect.	Receptor is insensitive to impact	Scheme elements present on the upstream water bodies are viaducts and therefore considered to have only very localised adverse effects. No effect anticipated on this quality element.					
	8. Ammonia	Good	-		N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	Receptor is insensitive to impact	Scheme elements present on the upstream water bodies are viaducts and therefore considered to have only very localised adverse effects. No effect anticipated on this quality element.					
	9. Temperature	-	-		N/A	N/A	Proposed culvert extension is likely to have a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	Proposed culvert extension is likely to have a minor impact on temperature. This impact is likely to have a minor/local effect in relation to the water body. Therefore, no change in status is anticipated.	Receptor is insensitive to impact	Receptor is insensitive to impact	Scheme elements present on the upstream water bodies are viaducts and therefore considered to have only very localised adverse effects. No effect anticipated on this quality element.					
	10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	N/A	N/A	Receptor is insensitive to impact	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect.	Scheme elements present on the upstream water bodies are viaducts and therefore considered to have only very localised adverse effects. No effect anticipated on this quality element.					
	Hydromorphological status																			**Hydromorphology Baseline**
WFD classification elements	11. Quantity and dynamics of river flow	-	-	Predicted change to status element(s) (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth contrasting with the natural bank and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and hydraulic roughness. • The Modelling of the River Trent at Lichfield Road is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	N/A	N/A	N/A	N/A	• The size of the channel means there is unlikely to be significant diversity of flow dynamics • Out of bank flows would be cut-off and culvert boundaries would be smooth contrasting with the natural bank and vegetated riparian zones, which may result in homogenised flow patterns and increased flow velocities due to increased channel gradients and hydraulic roughness. • The Modelling of the River Trent at Writer Gables is effectively a drainage ditch within the water body, and in practical terms the culvert would impact a small proportion of the water body	N/A	Scheme elements present on the upstream water bodies are viaducts and therefore considered to have only very localised adverse effects. No effect anticipated on this quality element.	• There is no significant planform change anticipated by viaduct footings within the floodplain. • Minor realignments and culverting of watercourses/drainings to the Anje Trent are likely to have localised effects on hydromorphology that would not be detrimental at water body scale. These are on separate tributaries so there is unlikely to be a cumulative effect	Undertake hydromorphological surveys to aid detailed design Incorporate hydromorphological measures into detailed design where practicable. Mitigation measures may include: • Create low flow channels in over-widened/over-deepened channels • Create reed fringes • Introduce riparian vegetation/green corridors where space allows • Recreate a sinuous river channel (re-meandering) where space allows • Retain marginal vegetation • Use of engineering techniques to assist natural recovery • Use soft engineering techniques	Minor and localised effects	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
	12. Connection to Groundwater	-	-		N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	N/A	N/A	N/A	• Likely to be no significant relationship between hydromorphology and groundwater	N/A	Scheme elements present on the upstream water bodies are viaducts and therefore considered to have only very localised adverse effects. No effect anticipated on this quality element.					
	13. River continuity	-	-		N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A	N/A	N/A	N/A	• The culvert would disconnect floodplains and out-of-bank flows, bank habitats and effectively sever existing flow and habitat continuity within and adjacent to both sides of the channel. • However, in water body terms, this is a minor feature and the culvert would not impact on deterioration of the overall water body status	N/A	Scheme elements present on the upstream water bodies are viaducts and therefore considered to have only very localised adverse effects. No effect anticipated on this quality element.					
	14. River depth and width variation bed	-	-		N/A	N/A	N/A	• Out of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme circumstances. • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A	N/A	N/A	N/A	• Out of bank flows would be severed by the culvert, and in-channel flows may become deeper than natural peak flows, and may even surcharge in extreme circumstances. • The size of the channel suggests there would not be significant loss of diversity in river depth and width	N/A	Scheme elements present on the upstream water bodies are viaducts and therefore considered to have only very localised adverse effects. No effect anticipated on this quality element.					
	15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	• The size of the channel suggests that there would not be significant loss of substrate or transport or scour. • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk.	N/A	N/A	N/A	N/A	• The size of the channel suggests that there would not be significant loss of substrate or transport or scour. • If the culvert base is set below the channel bed, the impacts on the bed should be minimal, but this is a risk.	N/A	Scheme elements present on the upstream water bodies are viaducts and therefore considered to have only very localised adverse effects. No effect anticipated on this quality element.					
	16. Structure of riparian zone	-	-		N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	N/A	N/A	N/A	• The culvert would disconnect the channel from the vegetated riparian zones and sever any existing riparian habitat continuity along the channel. But this is a minor feature and in practical terms may not impact on deterioration of water body status	N/A	Scheme elements present on the upstream water bodies are viaducts and therefore considered to have only very localised adverse effects. No effect anticipated on this quality element.					

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Before RBMP measure will happen	After RBMP measure will happen																	
Manage disturbance	-	In Place	Predicted change to status element(s) (green = none, amber = possibly, red = likely)	-	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-	-	-	• Nature of this particular impact means there is unlikely to be a proportional opportunity to implement significant wider water body improvements in terms of these measures, but opportunities must be investigated	-	-	No impact on mitigation measures and objectives identified.	-	-	No significant effects	
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone.	-	In Place		-	-	-	• Nature of impact means that opportunities to implement these measures could be limited in this particular water body, but the impact on this tributary is unlikely to inhibit future implementation of measures at water body scale	-	-	-	• Nature of impact means that opportunities to implement these measures could be limited in this particular water body, but the impact on this tributary is unlikely to inhibit future implementation of measures at water body scale	-	-	• Opportunities to implement these measures could be limited due to culverting in limited areas of minor tributaries as a result of the scheme, but the impact on this tributary is unlikely to inhibit future implementation of measures at water body scale	No additional mitigation required	No additional mitigation required	Minor and localised effects	
Avoid the need to dredge (e.g. minimise under-keel clearance; use fluid mud navigation; flow manipulation or training works)	-	In Place		-	-	-	-	-	-	-	-	-	-	-	No impact on mitigation measures and objectives identified.	-	-	No significant effects	
Prepare a dredging / disposal strategy	-	In Place		-	-	-	-	-	-	-	-	-	-	-		-	-		
Reduce impact of dredging	-	In Place		-	-	-	-	-	-	-	-	-	-	-		-	-		
Reduce sediment resuspension	-	In Place		-	-	-	-	-	-	-	-	-	-	-		-	-		
Alter timing of dredging / disposal	-	In Place		-	-	-	-	-	-	-	-	-	-	-		-	-		
Bank rehabilitation / reprofiling	-	In Place		-	-	-	-	-	-	-	-	-	-	-		-	-		
Site selection (dredged material disposal) (e.g. avoid sensitive sites)	-	In Place		-	-	-	-	-	-	-	-	-	-	-		-	-		
Awareness raising / information boards (boat wash / sources of fine sediment)	-	In Place		-	-	-	-	-	-	-	-	-	-	-		-	-		
Phased de-watering and other techniques	-	In Place		-	-	-	-	-	-	-	-	-	-	-		-	-		
Selective vegetation control regime	-	In Place		-	-	-	-	-	-	-	-	-	-	-		-	-		
Appropriate vegetation control technique	-	In Place		-	-	-	-	-	-	-	-	-	-	-		-	-		
Appropriate timing (vegetation control)	-	In Place		-	-	-	-	-	-	-	-	-	-	-		-	-		
Appropriate techniques (invasive species)	-	In Place		-	-	-	-	-	-	-	-	-	-	-		-	-		
Modify vessel design	-	In Place		-	-	-	-	-	-	-	-	-	-	-		-	-		
Vessel Management	-	In Place		-	-	-	-	-	-	-	-	-	-	-		-	-		
Sediment management	-	In Place		-	-	-	-	-	-	-	-	-	-	-		-	-		

A. Risk screening of potential to cause deterioration of current WFD Ecological status

Surface Water body	Current status	Status objective	Scheme Elements	Viaduct/Underbridge - Trent and Mersey Canal east viaduct (footings in or within riparian zone of watercourse)					Viaduct/Underbridge - Trent and Mersey Canal west viaduct (footings in or within riparian zone of watercourse)					Underbridge - Trent and Mersey Canal underbridge.					Impacts from other WFD water bodies (assessed separately)	OVERALL effect on element	Additional Proposed Mitigation Measures		RESIDUAL effect on element (following any additional mitigation measures)	
GB70410142	Good	Good Ecological Potential by 2015	Description of scheme element impact	*East Viaduct/underbridge over Trent and Mersey Canal (summit to Alrewas) at Fradley Wood (CFA22-SWC-069)*					*West Viaduct/underbridge over Trent and Mersey Canal (summit to Alrewas) at Wood End Lock (CFA22-SWC-071)*					*Trent and Mersey Canal underbridge at CFA22-SWC-069 - North Viaduct*							Construction	Operation		
Trent & Mersey Canal, summit to Alrewas			Identified biological impacts	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Vibration	Landtake (for bridge footings)	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage	Noise and vibration	Landtake	Shading	Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream	Drainage						
1.Macrophytes and phytobenthos - diatoms			Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2. Macrophytes and phytobenthos - macrophytes	-	-		- Receptor is insensitive to impact.	No footings in watercourse.	- Baseline surveys indicate limited channel macrophyte communities in the canal. - There may be minor changes in the cover and composition of macrophyte communities, but this is not considered to be greater than a minor localised change.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- Receptor is insensitive to impact.	No footings in watercourse.	- Baseline surveys indicate limited channel macrophyte communities in the canal. - There may be minor changes in the cover and composition of macrophyte communities, but this is not considered to be greater than a minor localised change.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- Receptor is insensitive to impact.	No footings in watercourse.	- Baseline surveys indicate limited channel macrophyte communities in the canal. - There may be minor changes in the cover and composition of macrophyte communities, but this is not considered to be greater than a minor localised change.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	None identified	Only minor and localised effects anticipated, no effect on WFD element	None required.	None required.		
3. Macroinvertebrates	-	-		- Receptor is insensitive to impact.	No footings in watercourse.	- Macroinvertebrate community (no baseline data available) may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- Receptor is insensitive to impact.	No footings in watercourse.	- Macroinvertebrate community (no baseline data available) may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- Receptor is insensitive to impact.	No footings in watercourse.	- Macroinvertebrate community (no baseline data available) may be slightly altered due to shading effects on macrophyte communities, but this is considered to be localised and minor.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	None identified	Only minor and localised effects anticipated, no effect on WFD element	None required.	None required.		
4. Fish	-	-		- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). - There were no baseline fish surveys, but fish habitat assessment indicated poor fish habitat quality in the canal. - Effects are likely to be temporary and minimal.	No footings in watercourse.	- No likely effects on fish.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). - There were no baseline fish surveys, but fish habitat assessment indicated poor fish habitat quality in the canal. - Effects are likely to be temporary and minimal.	No footings in watercourse.	- No likely effects on fish.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	- Possible temporary sub lethal effects on fish (e.g. displacement from impacted area). - There were no baseline fish surveys, but fish habitat assessment indicated poor fish habitat quality in the canal. - Effects are likely to be temporary and minimal.	No footings in watercourse.	- No likely effects on fish.	No anticipated effects, due to insignificant changes in hydromorphological regime.	• CoCP measures will be used to ensure that any discharges arising from viaduct construction do not have a negative effect on water quality.	None identified	Only minor and localised effects anticipated, no effect on WFD element	None required.	None required.		
Physico-Chemical status																								
5. Dissolved Oxygen	Good	-		N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	N/A	N/A	• Some shading with negligible/no effect.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on dissolved oxygen.	None identified	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourses) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	None required.	None required.	Implementation of CoCP measures (Section 16) and Best Practice Measures (BPM) during construction should ensure potential impacts to water quality are reduced to minor impacts with negligible effect. In reality, complete elimination of potential impacts arising from construction is impossible. Where this is the case, impacts are temporary, spatially limited or minor in relation to the overall size of the water body. No scheme elements are anticipated to have more than a local/minor effect on the water body during the operation of the scheme. There is a small risk associated with pollution from track drainage. Scheme drainage will be controlled and managed using a variety of balancing ponds and sustainable drainage systems (SuDS). Where this is not possible (i.e. over a floodplain or watercourses) and unattenuated discharge to the water body is required, mass balance calculations have been applied to determine the percentage increase in pollutant. If necessary, treatment will be provided prior to discharge.	
6. pH	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	None identified					
7. Phosphate	Good	-		N/A	N/A	N/A	y an open span bridge, so there would	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	N/A	N/A	y an open span bridge, so there would	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	N/A	N/A	N/A	tively an open span bridge, so there would be	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on phosphate.	None identified					
8. Ammonia	High	-		N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	N/A	Receptor is insensitive to impact	Receptor is insensitive to impact	None identified					
9. Temperature	-	-		N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	N/A	N/A	• Some shading with negligible/no effect.	Receptor is insensitive to impact	Receptor is insensitive to impact	None identified					
10. Specific Pollutants (Annex VIII)	High	-		N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	N/A	N/A	N/A	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	• CoCP measures (Section 16) implemented during construction, and suitable drainage systems (including balancing ponds) will ensure potential impacts to water quality are reduced to minor impacts with negligible effect. • Crossing design is effectively an open span bridge, so there would be no impact on specific pollutants.	None identified					
Hydromorphological status																								**Hydromorphology baseline**
11. Quantity and dynamics of river flow	-	-	Predicted change to status elements (green = none, amber = possibly, red = likely)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	• Hydromorphological baseline data derived from desk study of maps and aerial photographs. The assessment has been kept proportional to the type of crossings, the scale of the watercourses and their significance to the overall water body.
12. Connection to Groundwater	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
13. River continuity	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
14. River depth and width variation bed	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
15. Structure and substrate of river bed	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
16. Structure of riparian zone	-	-		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

B. Risk screening of potential to prevent future attainment of good Ecological status

RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen	When RBMP measure will happen																						
Manage disturbance	-	In Place	Predicted Change to status elements (green = none, amber = possibly, red = likely)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	There will be disturbance during construction although this will be minimised through CoCP measures.	None required.	None required.	Minor and localised effects	
Preserve and where possible enhance ecological value of marginal aquatic habitat, banks and riparian zone.	-	In Place		Some loss of bankside habitat due to construction of viaduct					Some loss of bankside habitat due to construction of viaduct					Some loss of bankside habitat due to construction of viaduct						Some loss of bankside habitat due to construction of viaduct , although there will be enhancements associated with the diversion.	None required.	None required.	Minor and localised effects	
Avoid the need to dredge (e.g. minimise under-keel clearance; use fluid mud navigation; flow manipulation or training works)	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Prepare a dredging / disposal strategy	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Reduce impact of dredging	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Reduce sediment resuspension	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Alter timing of dredging / disposal	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Bank rehabilitation / reprofiling	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Site selection (dredged material disposal) (e.g. avoid sensitive sites)	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	-
Awareness raising / information boards (boat wash / sources of fine sediment)	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Phased de-watering and other techniques	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Selective vegetation control regime	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Appropriate vegetation control technique	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Appropriate timing (vegetation control)	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Appropriate techniques (invasive species)	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Modify vessel design	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Vessel Management	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	
Sediment management	-	In Place		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	No effect anticipated.	None required.	None required.	No significant effects	

WR-001-000-Annex B: Groundwater Body Assessments

Water Body ID	Groundwater Body Name	CFA	River Basin District
GB40602G602800	Radlett Tertiaries	5, 6, 7, 8	Thames
GB40601G601200	Mid-Chilterns Chalk	7, 8, 9, 10	Thames
GB40601G604100	Chiltern Chalk Scarp	10, 11	Thames
GB40602G600700	Headington Corallian	11, 12	Thames
GB40501G402300	Upper Bedford Ouse Oolite Principal 1	13, 14, 15	Anglian
GB40502G401300	Upper Bedford Ouse Oolite Secondary	13, 14, 15	Anglian
GB40602G604200	Byfield Jurassic	15	Thames
GB40602G600200	Banbury Jurassic	15, 16	Thames
GB40902G990900	Warwickshire Avon - Secondary Mudrocks	16, 17, 18	Severn
GB40901G300700	Warwickshire Avon - PT Sandstone Warwick/Avon Confined	17, 18	Severn
GB40902G302200	Warwickshire Avon - Coal Measures Coventry	17, 18, 23	Severn
GB40401G302700	Tame Anker & Mease - PT Sandstone Nuneaton & Meriden	23	Humber
GB40402G990800	Tame Anker Mease - Secondary Combined	19, 20, 21, 22, 23, 24, 25, 26	Humber
GB40401G301000	Tame Anker Mease - PT Sandstone Birmingham Lichfield	21, 22, 26	Humber
GB40402G300300	Staffordshire Trent Valley - Mercia Mudstone East & Coal Measures	22	Humber

A. Risk screening of potential to cause deterioration of current WFD status

	Groundwater body					Scheme Elements	Bored Tunnel		Cutting		Retaining Wall		Tunnel Portal		Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
							Ruislip Tunnel (CFA6) - outside GWB in undesignated strata but close to boundary so included for completeness.		Copthall Cutting (CFA7)		West Ruislip Retaining Wall (CFA6)		West Ruislip Tunnel Portal (CFA6)					
	GB40602G602800					Phase	Construction	Construction & Operation	Construction & Operation		Construction & Operation		Construction & Operation					
	Radlett Tertiaries	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTE's or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTE's or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTE's or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTE's or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions				
WFD classification elements	**1.Saline or other intrusions.** To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	Low	Not At Risk	Good Ecological Status by 2015	Predicted change to status elements (green = none, amber = possibly, red = likely)	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impacts identified.	Remains Good Status	None required	Remains Good Status
	2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Poor	Low	At Risk	Good Ecological Status by 2015		Crosses beneath East & West Arms of Yeading Brook. W end is in River Pinn catchment. Watercourses all well above bedrock water table and are assumed to have limited groundwater dependency in area. No significant impacts predicted.	Nearest watercourses are not GW dependent. No significant impacts identified.	Cutting CU 024-L3 will pass through the London Clay into the Lambeth Group but would not penetrate the Chalk. The cutting is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	The cutting is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	The retaining wall is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	The retaining wall is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	Portal will pass through the London Clay into the Lambeth Group but would not penetrate the Chalk. The portal is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	The portal is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	No significant impacts identified.	No Significant Deterioration	None required	No Significant Deterioration
	3. Groundwater Dependent Terrestrial Ecosystems (GWDTE's). To assess the impact of groundwater abstractions on the condition of GWDTE'S.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		Islip Manor and Northolt Manor LNRs near E end of tunnel. Located above London Clay and well above bedrock water table so unlikely to be GWDTEs. No significant effects predicted.	No significant impacts identified.	Cutting CU 024-L3 will pass through the London Clay into the Lambeth Group but would not penetrate the Chalk. The cutting is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	The cutting is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	The retaining wall is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	The Retained Embankment is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	Portal will pass through the London Clay into the Lambeth Group but would not penetrate the Chalk. The portal is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	The portal is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	No significant impacts identified.	Remains Good Status	None required	Remains Good Status
	4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		W end of tunnel above water table. E end of tunnel below water table. TBM will have allow minor water ingress during construction. Inflow after grouting will be limited. Localised and temporary dewatering for shaft at South Ruislip.	Local influence on groundwater flow regime due to presence of tunnel in Chalk.	Cutting CU 024-L3 will pass through the London Clay into the Lambeth Group but would not penetrate the Chalk. The cutting is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	The cutting is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	The retaining wall is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	The Retained Embankment is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	Portal will pass through the London Clay into the Lambeth Group but would not penetrate the Chalk. The portal is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	The portal is above the groundwater table and would not interfere with groundwater flow. No impacts identified.	Local or temporary effects	Remains Good Status	None required	Remains Good Status
	Quantitative status	Poor														Poor		Poor

	Groundwater body					Scheme Elements	Bored Tunnel		Cutting		Retaining Wall		Tunnel Portal		Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
							Ruislip Tunnel (CFA6) - outside GWB in undesignated strata but close to boundary so included for completeness.		Copthall Cutting (CFA7)		West Ruislip Retaining Wall (CFA6)		West Ruislip Tunnel Portal (CFA6)					
	GB40602G602800					Phase	Construction	Construction & Operation	Construction & Operation		Construction & Operation		Construction & Operation					
	Radlett Tertiaries	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Disturbing or mobilising existing poor quality groundwater by depressurisation	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by depressurisation	Creating or altering of pathways along which existing poor quality groundwater can migrate				
WFD classification elements	**1. Saline or other intrusions.** To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	Low	Not At Risk	Good Chemical Status by 2015	Predicted change to status elements (green = none, amber = possibly, red = likely)	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impacts identified.	Remains Good Status	None required	Remains Good Status
	2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Poor	Low	At Risk	Good Chemical Status by 2015		Crosses beneath East & West Arms of Yeading Brook. W end is in River Pinn catchment. Watercourses all well above bedrock water table and are assumed to have limited groundwater dependency. No significant impacts identified as result of scheme element.	Crosses beneath East & West Arms of Yeading Brook. W end is in River Pinn catchment. Watercourses all well above bedrock water table and are assumed to have limited groundwater dependency. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element.	Cutting CU 024-L3 will pass through the London Clay into the Lambeth Group but would not penetrate the Chalk. The cutting is above the groundwater table. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element.	Retained Embankment is unlikely to encounter groundwater in the Chalk. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element.	Portal will pass through the London Clay into the Lambeth Group but would not penetrate the Chalk. The portal is above the groundwater table. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element.	No significant impacts identified.	No Significant Deterioration	None required	No Significant Deterioration
	3. GWDTE's. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTE's.	Good	High	Probably Not At Risk	Good Chemical Status by 2015		Islip Manor and Northolt Manor LNRs near E end of tunnel. Located above London Clay and well above bedrock water table so unlikely to be GWDTEs. No significant effects predicted.	No significant impacts identified.	Cutting CU 024-L3 will pass through the London Clay into the Lambeth Group but would not penetrate the Chalk. No GWDTEs located in vicinity of scheme element. No impacts identified as result of scheme element.	Cutting CU 024-L3 will pass through the London Clay into the Lambeth Group but would not penetrate the Chalk. No GWDTEs located in vicinity of scheme element. No impacts identified as result of scheme element	Retained Embankment is unlikely to encounter groundwater in the Chalk. No GWDTEs located in vicinity of scheme element. No impacts identified as result of scheme element.	Retained Embankment is unlikely to encounter groundwater in the Chalk. No GWDTEs located in vicinity of scheme element. No impacts identified as result of scheme element.	Portal will pass through the London Clay into the Lambeth Group but would not penetrate the Chalk. The portal is above the groundwater table. No GWDTEs located in vicinity of scheme element. No impacts identified as result of scheme element.	Portal will pass through the London Clay into the Lambeth Group but would not penetrate the Chalk. The portal is above the groundwater table. No GWDTEs located in vicinity of scheme element. No impacts identified as result of scheme element	No significant impacts identified.	Remains Good Status	None required	Remains Good Status
	4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		Designated DrWPA. Close to SPZ 1 at W end but tunnel is above water table here. Tunnelling and shaft construction potential to have moderate impact on groundwater quality due to migration of fluids and turbidity. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Minor or temporary change in groundwater quality predicted.	In DrWPA and near SPZ1. Inward head gradient. Tunnel grouted in place. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Designated groundwater DrWPA and located within SPZ1. Cutting is above the groundwater table. Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	Designated groundwater DrWPA and located within SPZ1. Cutting is above the groundwater table. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	Designated groundwater DrWPA and located within SPZ1. Retained embankment unlikely to intersect groundwater. Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	Designated groundwater DrWPA and located within SPZ1. Retained embankment unlikely to intersect groundwater. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	Designated groundwater DrWPA and located within SPZ1. Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	Designated groundwater DrWPA and located within SPZ1. Portal is above the groundwater table. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	Localised/temporary or other minor effect. No change in status predicted.	Remains Good Status	None required	Remains Good Status
	5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		Tunnel extends below water table into Chalk. Tunnelling and shaft construction will have potential to impact groundwater quality due to fluids used in construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Minor or temporary change in groundwater quality predicted.	Inward head gradient. Tunnel grouted in place. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Cutting is above the groundwater table. Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	Cutting is above the groundwater table. Potential for impact to groundwater quality through the unsaturated zone. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	Retained embankment unlikely to intersect groundwater. Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	Retained embankment unlikely to intersect groundwater. Potential for impact to groundwater quality through the unsaturated zone. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	Portal is above the groundwater table. Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	Portal is above the groundwater table. Potential for impact to groundwater quality through the unsaturated zone. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	Localised/temporary or other minor effect. No change in status predicted.	Remains Good Status	None required	Remains Good Status
	Chemical status	Poor														Poor		Poor
	Overall status	Poor														Poor		Poor

B. Risk screening of potential to prevent future attainment of good WFD status

WFD classification element currently at less than good status	Current status			Status objective	Scheme Elements	Bored Tunnel		Cutting		Retaining Wall		Tunnel Portal		Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Ruislip Tunnel (CFA6)		Copthall Cutting (CFA7)		West Ruislip Retaining Wall (CFA6)		West Ruislip Tunnel Portal (CFA6)					
2. Surface water (quantitative & chemical)	Poor			Good Status by 2015	Phase	Construction	Construction & Operation	Construction & Operation		Construction & Operation		Construction & Operation					
RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	**Where RBMP measure will happen**			**When RBMP measure will happen**	Identified chemical impacts	Disturbing or mobilising existing poor quality groundwater by depressurisation	Creating or altering of pathways along which existing poor quality groundwater can migrate	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTE's or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by depressurisation	Creating or altering of pathways along which existing poor quality groundwater can migrate				
Registrations (in conjunction with Standard Rules) - Implement new regulatory approach (via Environmental Permitting Regulations) arising from implementation of new Groundwater Directive (2006/116/EC).	Thames RBD			2012	Predicted change to status elements (green = none, amber = possibly, red = likely)	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	None required	RBMP measure insensitive to impact
R&D on fate and transport of phosphate in groundwater to determine impact on surface water.	Thames RBD			2012		No significant effects predicted.	No significant effects predicted.	Cutting is above groundwater table. No impacts identified as result of scheme element.	Cutting is above groundwater table. No impacts identified as result of scheme element.	Retained embankment unlikely to intersect groundwater. No impacts identified as result of scheme element.	Retained embankment unlikely to intersect groundwater. No impacts identified as result of scheme element.	Portal is above the groundwater table. No impacts identified as result of scheme element.	Portal is above the groundwater table. No impacts identified as result of scheme element.	No significant impacts identified.	No significant impacts identfied.	None required	No significant impacts identified.
Investigation to improve confidence in groundwater quantitative status result	Radlett Tertiaries			2010		Include tunnel dewatering in any assessments for quantitative status	No significant effects predicted.	Cutting is above the groundwater table and would not interfere with groundwater flow. Therefore there is no potential for impact on water balance or groundwater flow.	Cutting is above groundwater table. No impacts identified as result of scheme element.	Retained embankment unlikely to intersect groundwater. No impacts identified as result of scheme element.	Retained embankment unlikely to intersect groundwater. No impacts identified as result of scheme element.	Portal is above the groundwater table. No impacts identified as result of scheme element.	Portal is above the groundwater table. No impacts identified as result of scheme element.	No significant impacts identified.	No significant impacts identfied.	None required	No significant impacts identified.

Ref:

Environment Agency (2013) Colne abstraction licensing strategy
Environment Agency website; What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx
Environment Agency (2009) River Basin Management Plan - Thames River Basin District - Annex C Actions to deliver objectives

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Bored Tunnel		Cutting			
						Chiltern Tunnel (CFA7, CFA8, CFA9)		Tilehouse Lane Cutting (CFA7)		Chiltern Tunnel South Approach Cutting (CFA7)	
GB40601G601200					Phase	Construction	Construction & Operation	Construction & Operation		Construction & Operation	
Mid-Chilterns Chalk	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions
WFD classification elements					**Predicted change to status elements (green = none, amber = possibly, red = likely)**						
1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Poor	High	At Risk	Good Ecological Status by 2015		Tunnelling may influence GW-SW interactions due to influence on local fracturing. May influence dry weather flows at Shardeloes Lake crossing. Misbourne does not always flow at Chalfont St Giles crossing during dry weather. Dewatering of the vent shafts during construction may cause moderate impact through reduction in flow in River Misbourne. However, negligible resultant impact to groundwater through mitigation where dewatering effluent will be returned to the aquifer through reinjection/recharge wells adjacent to each shaft. No net abstraction and impact on river flows. Potential to exacerbate occasional flooding in River Misbourne due to mounding of groundwater unlikely due to small tunnel diameter in relation to thickness of Chalk aquifer so change to groundwater flow regime will be negligible.	Tunnelling may influence GW-SW interactions due to influence on local fracturing and grouting. May influence dry weather flows at Shardeloes Lake crossing. Misbourne does not always flow at Chalfont St Giles crossing during dry weather. Potential to exacerbate occasional flooding in River Misbourne due to mounding of groundwater unlikely due to small tunnel diameter in relation to thickness of Chalk aquifer so change in flows will be negligible.	Scheme element is greater than 10m above maximum recorded groundwater levels in bedrock aquifer. Perched groundwater in superficial deposits may be present. No significant impacts on groundwater / surface water interactions predicted.	No significant impacts identified as result of scheme element	No impact on surface water / groundwater interaction as scheme element above groundwater table and no dewatering proposed.	No impact on surface water / groundwater interaction as scheme element above groundwater table
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs). To assess the impact of groundwater abstractions on the condition of GWDTEs.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		Dewatering of the vent shafts during construction may cause moderate impact through reduction in flow in River Misbourne. However, negligible resultant impact to groundwater through mitigation where dewatering effluent will be returned to the aquifer through reinjection/recharge wells adjacent to each shaft. No net abstraction and impact on river flows. Potential to exacerbate occasional flooding in River Misbourne due to mounding of groundwater unlikely due to small tunnel diameter in relation to thickness of Chalk aquifer so change to groundwater flow regime will be negligible.	Potential to exacerbate occasional flooding in River Misbourne due to mounding of groundwater unlikely due to small tunnel diameter in relation to thickness of Chalk aquifer so change in flows will be negligible.	Scheme element is greater than 10m above maximum recorded groundwater levels in bedrock aquifer. Perched groundwater in superficial deposits may be present. No significant impacts on nearby GWDTEs predicted.	No significant impacts identified as result of scheme element	No known GWDTEs located in vicinity of scheme element. Scheme element is above groundwater table and no dewatering proposed.	No impact as scheme element above groundwater table.
4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Poor	Low	At Risk	Good Ecological Status by 2015		Dewatering during construction of the tunnel likely to cause minor impact on groundwater quality and flows in the chalk aquifer. Reinjection of dewatering effluent will mean that there is no net abstraction. Negligible impacts after mitigation.	Potential disruption to groundwater flow in the Chalk. An altered flow regime may reduce source output to abstractions close to the route. Considering the size of the tunnels and vent shafts and because Chilterns Tunnel roughly parallel to groundwater flow, scheme element is unlikely to form obstruction to flow. Effects on flow regime expected to be localised.	Scheme element is greater than 10m above maximum recorded groundwater levels. Perched groundwater in superficial deposits (sand and gravels) may be intersected by cutting. No significant impacts on water balance of bedrock aquifer predicted.	No impacts identified as result of scheme element	Scheme element is 10 to 15m above maximum recorded groundwater levels. No impact as no dewatering proposed.	No impacts identified as result of scheme element
Quantitative status	Poor										

Groundwater body					Scheme Elements	Bored Tunnel		Cutting			
						Chiltern Tunnel (CFA7, CFA8, CFA9)		Tilehouse Lane Cutting (CFA7)		Chiltern Tunnel South Approach Cutting (CFA7)	
GB40601G601200					Phase	Construction	Construction & Operation	Construction & Operation		Construction & Operation	
Mid-Chilterns Chalk	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Disturbing or mobilising existing poor quality groundwater by depressurisation	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate
WFD classification elements					**Predicted change to status elements (green = none, amber = possibly, red = likely)**						
1. Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Poor	High	Probably Not At Risk	Good Chemical Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Good	Low	At Risk	Good Chemical Status by 2015		Tunnel passes under surface water bodies of Shardeloes Lake and River Misbourne. Tunnelling and shaft construction potential to have minor impact on groundwater quality due to fluids used during construction, piling and diaphragm walls. Water quality issues within groundwater likely to diminish within groundwater towards surface water receptors. Dewatering effluent will be returned to the aquifer through reinjection/recharge wells adjacent to each shaft. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Tunnelling may influence GW-SW interactions due to influence on local fracturing and grouting. May influence water chemistry in Misbourne & Shardeloes Lake during dry weather.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No significant pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element
3. GWDTEs. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTEs.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		Tunnel passes under groundwater dependent habitats of Shardeloes Lake and River Misbourne. Tunnelling and shaft construction potential to have minor impact on groundwater quality due to fluids used during construction, piling and diaphragm walls. Water quality issues within groundwater likely to diminish within groundwater towards surface water receptors. Dewatering effluent will be returned to the aquifer through reinjection/recharge wells adjacent to each shaft. No net abstraction and impact on GWDTE. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Tunnelling may influence GW-SW interactions due to influence on local fracturing and grouting. May influence water chemistry in Misbourne & Shardeloes Lake during dry weather.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No potential pollutant linkage as no known GWDTEs located in vicinity of scheme element. Scheme element is above groundwater table.	No impacts identified as result of scheme element
4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	High	At Risk	Good Chemical Status by 2015		Designated DrWPA, located within SPZ1 to 3 and near private abstractions. Landfills and existing poor quality groundwater in vicinity. Tunnelling and shaft construction potential to have moderate impact on groundwater quality at nearby PWS / SPZ due to migration of fluids and turbidity. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Temporary change in groundwater quality predicted. Additional mitigation for PWS still to be finalised.	In DrWPA and within SPZ1. Tunnel grouted in place. Inward head gradient. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts predicted as result of scheme element but sensitive setting in SPZ1.	Designated DrWPA and located within SPZ1 (from 3 PWS abstractions) and private abstractions. Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Major change in groundwater quality predicted.	Designated DrWPA, located within SPZ1 (from 3 PWS abstractions) and private abstractions. Creation of new preferential pathways to groundwater / within aquifer. CoCP and best practice for design, construction and operations reduce risks to groundwater quality.	In DrWPA and SPZ2. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	In DrWPA and SPZ2. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.
5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		Landfills and existing poor quality groundwater in vicinity. Tunnelling and shaft construction will have potential to impact groundwater quality due to fluids used in construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Temporary change in groundwater quality predicted.	Inward head gradient. Tunnel grouted in place. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element
Chemical Status	Poor										
Overall status	Poor										

B. Risk screening of potential to prevent future attainment of good WFD status

WFD classification element currently at less than good status	Current status			Status objective	Scheme Elements	Bored Tunnel		Cutting			
						Chiltern Tunnel (CFA7, CFA8, CFA9)		Tilehouse Lane Cutting (CFA7)		Chiltern Tunnel South Approach Cutting (CFA7)	
2. Surface water (quantitative), 4. Water balance (quantitative), 1. Saline or other intrusions (chemical)	Poor			Good Status by 2015	Phase	Construction	Construction & Operation	Construction & Operation		Construction & Operation	
RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	**Where RBMP measure will happen**			**When RBMP measure will happen**	**Identified chemical impacts**	Disturbing or mobilising existing poor quality groundwater by depressurisation	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate
Predicted change to status elements (green = none, amber = possibly, red = likely)											
Follow up 1990s report using recent data and knowledge of groundwater surface water inter-relationship, including use of groundwater modelling (hazardous substances and non-hazardous pollutants; Priority Substances & Specific Pollutants).	Mid-Chilterns Chalk			2010		Tunnel passes under surface water bodies of Shardeloes Lake and River Misbourne. Tunnelling and shaft construction potential to have minor impact on groundwater quality due to fluids used during construction, piling and diaphragm walls. Water quality issues within groundwater likely to diminish within groundwater towards surface water receptors. Dewatering effluent will be returned to the aquifer through reinjection/recharge wells adjacent to each shaft. No net abstraction and impact on river flows. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No significant pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element
Thames Groundwater Pollution Prevention project.	Mid-Chilterns Chalk			2010		Tunnelling and shaft construction will have potential to impact groundwater quality due to fluids used in construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Minor or temporary change in groundwater quality predicted.	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element
Comply with Pt 2a Contaminated Land Remediation Notice served to clean up bromate (and bromide) groundwater pollution plume.	Mid-Chilterns Chalk			2010		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
Targeted Pollution Prevention campaign and advice to industry driven by groundwater pollution.	Mid-Chilterns Chalk			2012		Tunnelling and shaft construction will have potential to impact groundwater quality due to fluids used in construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Minor or temporary change in groundwater quality predicted.	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element
Registrations (in conjunction with Standard Rules) - Implement new regulatory approach (via Environmental Permitting Regulations) arising from implementation of new Groundwater Directive (2006/116/EC).	Thames RBD			2012		RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact
Appropriate policies in Local Development Plans to ensure protection of groundwater.	Mid-Chilterns Chalk			2010		RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact
Improvements to 2 water company sewage treatment works to protect groundwater quality (PR09).	Mid-Chilterns Chalk			2015		RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact
R&D on fate and transport of phosphate in groundwater to determine impact on surface water.	Thames RBD			2012		CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No significant pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element

Ref:
Environment Agency (2013) Colne abstraction licensing strategy
Environment Agency website; What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx
Environment Agency (2009) River Basin Management Plan - Thames River Basin District - Annex C Actions to deliver objectives

A. Risk screening of potential to cause deterioration of current WFD status

	Groundwater body					Scheme Elements	Cutting					
							Chiltern tunnel north approach cutting (CFA9)		South Heath Cutting (CFA9)		Rocky Lane South Cutting (CFA9, CFA10)	
	GB40601G601200					Phase	Construction & Operation		Construction & Operation		Construction & Operation	
	Mid-Chilterns Chalk	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions
WFD classification elements	**1.Saline or other intrusions.** To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Probably Not At Risk	Good Ecological Status by 2015	Predicted change to status elements (green = none, amber = possibly, red = likely)	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
	2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Poor	High	At Risk	Good Ecological Status by 2015		No impact on surface water / groundwater interaction as scheme element above groundwater table and no dewatering proposed.	No impact on surface water / groundwater interaction as scheme element above groundwater table	No impact on surface water / groundwater interaction as scheme element above groundwater table and no dewatering proposed.	No impact on surface water / groundwater interaction as scheme element above groundwater table	No impact on surface water / groundwater interaction as scheme element above groundwater table and no dewatering proposed.	No impact on surface water / groundwater interaction as scheme element above groundwater table
	3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs). To assess the impact of groundwater abstractions on the condition of GWDTEs.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		No potential impact on GWDTEs as scheme element above groundwater table and no dewatering proposed.	No impact as scheme element above groundwater table.	No potential impact on GWDTEs as scheme element above groundwater table and no dewatering proposed.	No impact as scheme element above groundwater table.	No known GWDTEs located in vicinity of scheme element. Scheme element is above groundwater table and no dewatering proposed.	No impact as scheme element above groundwater table.
	4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Poor	Low	At Risk	Good Ecological Status by 2015		Scheme element is 20-50m above maximum recorded groundwater levels. No impact as no dewatering proposed.	No impacts identified as result of scheme element	Scheme element is 50-90m above maximum recorded groundwater levels. No impact as no dewatering proposed.	No impacts identified as result of scheme element	Scheme element is at least 30m above maximum recorded groundwater levels. No impact as no dewatering proposed.	No impacts identified as result of scheme element

Quantitative status	Poor

	Groundwater body					Scheme Elements	Cutting					
							Chiltern tunnel north approach cutting (CFA9)		South Heath Cutting (CFA9)		Rocky Lane South Cutting (CFA9, CFA10)	
	GB40601G601200					Phase	Construction & Operation		Construction & Operation		Construction & Operation	
	Mid-Chilterns Chalk	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate
WFD classification elements	**1. Saline or other intrusions.** To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Poor	High	Probably Not At Risk	Good Chemical Status by 2015	Predicted change to status elements (green = none, amber = possibly, red = likely)	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
	2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Good	Low	At Risk	Good Chemical Status by 2015		No significant pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No significant pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No significant pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element
	3. GWDTEs. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTEs.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		Scheme element is 20-50m above groundwater table. No impacts identified as result of scheme element	Scheme element is 20-50m above groundwater table. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact on GWDTEs following mitigation.	Scheme element is 20-50m above groundwater table. No impacts identified as result of scheme element	Scheme element is 20-50m above groundwater table. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact on GWDTEs following mitigation.	No potential pollutant linkage as no known GWDTEs located in vicinity of scheme element. Scheme element is above groundwater table.	No impacts identified as result of scheme element
	4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	High	At Risk	Good Chemical Status by 2015		Designated DrWPA and located within SPZ2 (from PWS). CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Minor or temporary change in groundwater quality predicted.	In DrWPA and SPZ2. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Designated DrWPA and located within SPZ2 (from PWS). CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Minor or temporary change in groundwater quality predicted.	In DrWPA and SPZ2. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Designated DrWPA and located within SPZ2 (from PWS). CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	In DrWPA and SPZ2. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.
	5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element

Chemical Status	Poor

Overall status	Poor

B. Risk screening of potential to prevent future attainment of good WFD status

WFD classification element currently at less than good status	Current status			Status objective	Scheme Elements	Cutting					
						Chiltern tunnel north approach cutting (CFA9)		South Heath Cutting (CFA9)		Rocky Lane South Cutting (CFA9, CFA10)	
2. Surface water (quantitative), 4. Water balance (quantitative), 1. Saline or other intrusions (chemical).	Poor			Good Status by 2015	Phase	Construction & Operation		Construction & Operation		Construction & Operation	
RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	**Where RBMP measure will happen**			**When RBMP measure will happen**	Identified chemical impacts	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate
Follow up 1990s report using recent data and knowledge of groundwater surface water inter-relationship, including use of groundwater modelling (hazardous substances and non-hazardous pollutants; Priority Substances & Specific Pollutants).	Mid-Chilterns Chalk			2010	Predicted change to status elements (green = none, amber = possibly, red = likely)	No significant pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No significant pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No significant pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element
Thames Groundwater Pollution Prevention project.	Mid-Chilterns Chalk			2010		CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element
Comply with Pt 2a Contaminated Land Remediation Notice served to clean up bromate (and bromide) groundwater pollution plume.	Mid-Chilterns Chalk			2010		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
Targeted Pollution Prevention campaign and advice to industry driven by groundwater pollution.	Mid-Chilterns Chalk			2012		CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element
Registrations (in conjunction with Standard Rules) - Implement new regulatory approach (via Environmental Permitting Regulations) arising from implementation of new Groundwater Directive (2006/116/EC).	Thames RBD			2012		RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact
Appropriate policies in Local Development Plans to ensure protection of groundwater.	Mid-Chilterns Chalk			2010		RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact
Improvements to 2 water company sewage treatment works to protect groundwater quality (PR09).	Mid-Chilterns Chalk			2015		RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact
R&D on fate and transport of phosphate in groundwater to determine impact on surface water.	Thames RBD			2012		No significant pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No significant pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No significant pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element

Ref:
Environment Agency (2013) Colne abstraction licensing strategy
Environment Agency website; What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx
Environment Agency (2009) River Basin Management Plan - Thames River Basin District - Annex C Actions to deliver objectives

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Embankment	Green Tunnel		Retaining Wall		Tunnel Portal	
						Embankments in vicinity of Chiltern Tunnel and South Harefield (CFA7)	South Heath cut-and-cover tunnel (CFA9)		Chiltern south approach retaining wall (CFA7)		Chiltern Tunnel north and south Portals (CFA7 and CFA9)	
GB40601G601200					Phase	Construction & Operation	Construction & Operation		Construction & Operation		Construction & Operation	
Mid-Chilterns Chalk	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)							
1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Poor	High	At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impact on surface water / groundwater interaction as scheme element above groundwater table and no dewatering proposed.	No impact on surface water / groundwater interaction as scheme element above groundwater table	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs). To assess the impact of groundwater abstractions on the condition of GWDTEs.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impact as scheme element above groundwater table and no dewatering proposed.	No impact as scheme element above groundwater table.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Poor	Low	At Risk	Good Ecological Status by 2015		Minor influence on local recharge patterns. No significant impacts identified as result of scheme element.	Scheme element is greater than 30m above maximum recorded groundwater levels. No impact as no dewatering proposed.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element

Quantitative status	Poor

Groundwater body					Scheme Elements	Embankment	Green Tunnel		Retaining Wall		Tunnel Portal	
						Embankments in vicinity of Chiltern Tunnel and South Harefield (CFA7)	South Heath cut-and-cover tunnel (CFA9)		Chiltern south approach retaining wall (CFA7)		Chiltern Tunnel north and south Portals (CFA7 and CFA9)	
GB40601G601200					Phase	Construction & Operation	Construction & Operation		Construction & Operation		Construction & Operation	
Mid-Chilterns Chalk	Current status	Confidence	Risk	Status objective	Identified chemical impacts	None identified	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by depressurisation	Creating or altering of pathways along which existing poor quality groundwater can migrate
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)							
1. Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Poor	High	Probably Not At Risk	Good Chemical Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Good	Low	At Risk	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No significant pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element.	No significant pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
3. GWDTEs. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTEs.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		No impacts identified as result of scheme element	No potential pollutant linkage as no known GWDTEs located in vicinity of scheme element. Scheme element is above groundwater table.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	High	At Risk	Good Chemical Status by 2015		Designated DrWPA and located within SPZ1 (from PWS). CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Designated DrWPA and located within SPZ2 (from PWS). CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Minor or temporary change in groundwater quality predicted.	In DrWPA and SPZ2. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element

Chemical Status	Poor

Overall status	Poor

B. Risk screening of potential to prevent future attainment of good WFD status

WFD classification element currently at less than good status	Current status			Status objective	Scheme Elements	Embankment	Green Tunnel		Retaining Wall		Tunnel Portal	
2. Surface water (quantitative), 4. Water balance (quantitative), 1. Saline or other intrusions (chemical).	Poor			Good Status by 2015		Embankments in vicinity of Chiltern Tunnel and South Harefield (CFA7)	South Heath cut-and-cover tunnel		Chiltern south approach retaining wall		Chiltern Tunnel north and south Portals	
					Phase	Construction & Operation	Construction & Operation		Construction & Operation		Construction & Operation	
RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	**Where RBMP measure will happen**			**When RBMP measure will happen**	Identified chemical impacts	None identified	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by depressurisation	Creating or altering of pathways along which existing poor quality groundwater can migrate
Predicted change to status elements (green = none, amber = possibly, red = likely)												
Follow up 1990s report using recent data and knowledge of groundwater surface water inter-relationship, including use of groundwater modelling (hazardous substances and non-hazardous pollutants; Priority Substances & Specific Pollutants).	Mid-Chilterns Chalk			2010		No impacts identified as result of scheme element	No significant pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
Thames Groundwater Pollution Prevention project.	Mid-Chilterns Chalk			2010		CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element
Comply with Pt 2a Contaminated Land Remediation Notice served to clean up bromate (and bromide) groundwater pollution plume.	Mid-Chilterns Chalk			2010		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
Targeted Pollution Prevention campaign and advice to industry driven by groundwater pollution.	Mid-Chilterns Chalk			2012		CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element
Registrations (in conjunction with Standard Rules) - Implement new regulatory approach (via Environmental Permitting Regulations) arising from implementation of new Groundwater Directive (2006/116/EC).	Thames RBD			2012		RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact
Appropriate policies in Local Development Plans to ensure protection of groundwater.	Mid-Chilterns Chalk			2010		RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact
Improvements to 2 water company sewage treatment works to protect groundwater quality (PR09).	Mid-Chilterns Chalk			2015		RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact
R&D on fate and transport of phosphate in groundwater to determine impact on surface water.	Thames RBD			2012		No impacts identified as result of scheme element	No significant pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element

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A. Risk screening of potential to cause deterioration of current WFD status

	Groundwater body					Scheme Elements	Viaduct		Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
							Colne Valley Viaduct (CFA7)	Wendover Dean viaduct and embankments (CFA10)				
	GB40601G601200					Phase	Construction & Operation	Construction & Operation				
	Mid-Chilterns Chalk	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions				
WFD classification elements	**1.Saline or other intrusions.** To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Probably Not At Risk	Good Ecological Status by 2015	Predicted change to status elements (green = none, amber = possibly, red = likely)	There is potential for piling activities or construction dewatering to disperse or mobilise existing contamination. Effects expected to be localised. Detailed method statements will minimise the risk that contamination is mobilised or dispersed as a result of construction. CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime. No significant impact on overall groundwater quality predicted.	No impacts identified as result of scheme element	Potential localised effects. Negligible impact following mitigation.	Remains Good Status	None required	Remains Good Status
	2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Poor	High	At Risk	Good Ecological Status by 2015		Colne Valley SSSI may be impacted by changes to groundwater levels associated with piling. Dewatering, if required, will be temporary and localised. Abstracted water returned to groundwater via infiltration or re-injection or to adjacent stretch of surface water body. Localised mounding of groundwater around piles may occur. Grand Union canal assumed not to be in direct hydraulic continuity with groundwater. Changes in groundwater levels may lead to impact on surface water quality and levels in river. CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime. No significant effect on river predicted.	No impact on surface water / groundwater interaction as scheme element above groundwater table and no dewatering proposed.	Potential localised effects. Negligible impact following mitigation.	No Significant Deterioration	None required	Potential localised effects. Negligible impact following mitigation.
	3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs). To assess the impact of groundwater abstractions on the condition of GWDTEs.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		Lakes comprising the Colne Valley SSSI may be impacted by changes to groundwater levels associated with piling. Dewatering, if required, will be temporary and localised. Abstracted water returned to groundwater via infiltration or re-injection or to adjacent stretch of surface water body. Localised mounding of groundwater around piles may occur. Changes in groundwater levels may lead to impact on surface water quality and levels and subsequent local ecology in SSSI. CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime. No significant effect at GWDTE predicted.	No impact as scheme element above groundwater table and no dewatering proposed.	Potential localised effects. Negligible impact following mitigation.	Remains Good Status	None required	Remains Good Status
	4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Poor	Low	At Risk	Good Ecological Status by 2015		Temporary and localised dewatering during construction may be required. Foundation piling may disrupt groundwater flow and cause minor obstruction to groundwater flow causing localised mounding close to the route. The altered flow regime may reduce source output to abstractions close to the route. CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime. No significant impacts predicted.	No impact as scheme element above groundwater and no dewatering proposed. Minor influence on local recharge patterns. No significant impacts identified as result of scheme element.	Potential localised effects. Negligible impact following mitigation.	No Significant Deterioration	None required	No Significant Deterioration
	Quantitative status	Poor								Poor		Poor

	Groundwater body					Scheme Elements	Viaduct		Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
							Colne Valley Viaduct (CFA7)	Wendover Dean viaduct and embankments (CFA10)				
	GB40601G601200					Phase	Construction & Operation	Construction & Operation				
	Mid-Chilterns Chalk	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate				
WFD classification elements	**1. Saline or other intrusions.** To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Poor	High	Probably Not At Risk	Good Chemical Status by 2015	Predicted change to status elements (green = none, amber = possibly, red = likely)	There is potential for piling activities or construction dewatering to disperse or mobilise existing contamination. Impacts expected to be localised. Detailed method statements will minimise the risk that contamination is mobilised or dispersed as a result of construction. Pre- and post-construction monitoring will inform extent of existing contaminant. Construction works unlikely to alter overall groundwater quality significantly as a result of existing pollution. Negligible impact following mitigation.	No impacts identified as result of scheme element	Potential localised effects. Negligible impact following mitigation.	No Significant Deterioration	None required	No Significant Deterioration
	2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Good	Low	At Risk	Good Chemical Status by 2015		Colne Valley SSSI may be impacted by changes to groundwater quality associated with piling. Landfills and existing poor quality groundwater in vicinity. Creation of new preferential pathways within and between shallow and bedrock aquifers due to piling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. Changes in groundwater quality may lead to impact on surface water quality. CoCP and best practice for design (particularly selection of piling method), construction and operations reduce risks to water quality. Implementation of monitoring regime. No significant effect on river predicted.	No impact on surface water / groundwater interaction as no dewatering proposed and scheme element is above groundwater levels. Implementation of CoCP will mitigate against any pollutant link to surface water during construction.	Potential localised effects. Negligible impact following mitigation.	Remains Good Status	None required	Remains Good Status
	3. GWDTEs. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTEs.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		Colne Valley SSSI may be impacted by changes to groundwater quality associated with piling. Landfills and existing poor quality groundwater in vicinity. Creation of new preferential pathways within and between shallow and bedrock aquifers due to piling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. Changes in groundwater quality may lead to impact on surface water quality and GWDTE. CoCP and best practice for design (particularly selection of piling method), construction and operations reduce risks to water quality. Implementation of monitoring regime. No significant effect on GWDTE predicted.	No GWDTEs located in vicinity of scheme element. No impacts identified as result of scheme element	Potential localised effects. Negligible impact following mitigation.	Remains Good Status	None required	Remains Good Status
	4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	High	At Risk	Good Chemical Status by 2015		Designated DrWPA, located within SPZ1 (from PWS and groundwater) and private abstractions. Landfills and existing poor quality groundwater in vicinity. Creation of new preferential pathways within and between shallow and bedrock aquifers due to piling. Turbidity or fluids used in construction may influence water quality. CoCP and best practice for design (in particular selection of piling techniques), construction and operations reduce risks to groundwater quality. Implementation of monitoring regime. Temporary impacts on water quality possible. Additional mitigation for PWS still to be finalised.	Designated groundwater DrWPA and located within SPZ2 from PWS. CoCP and best practice for design, construction and operations, particularly piling methodology, reduce risks to groundwater quality. No significant impacts predicted as result of scheme element but sensitive setting in SPZ2.	Potential local or temporary effects. Sub-water table activities within SPZ1. Mitigation for PWS (including possible use of alternative sources during construction) still be to agreed.	Remains Good Status assuming mitigation measures for PWS are agreed prior to construction	Agree mitigation measures with Affinity Water. Consider separately the WFD consequences of any alternative PWS supply (with respect to both quantitative & chemical status)	Remains Good Status
	5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		Creation of new preferential pathways within and between shallow and bedrock aquifers due to piling. Landfills and existing poor quality groundwater in vicinity. Turbidity or fluids used in construction may influence water quality locally. CoCP and best practice for design (in particular selection of piling techniques), construction and operations reduce risks to groundwater quality. Implementation of monitoring regime. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Potential localised effects. Negligible impact following mitigation.	Remains Good Status	None required	Remains Good Status
	Chemical Status	Poor								Poor		Poor
	Overall status	Poor								Poor		Poor

B. Risk screening of potential to prevent future attainment of good WFD status

WFD classification element currently at less than good status	Current status			Status objective	Scheme Elements	Viaduct		Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Colne Valley Viaduct (CFA7)	Wendover Dean viaduct and embankments (CFA10)				
2. Surface water (quantitative), 4. Water balance (quantitative), 1. Saline or other intrusions (chemical)	Poor			Good Status by 2015	**Phase**	Construction & Operation	Construction & Operation				
RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	**Where RBMP measure will happen**			**When RBMP measure will happen**	**Identified chemical impacts**	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate				
Follow up 1990s report using recent data and knowledge of groundwater surface water inter-relationship, including use of groundwater modelling (hazardous substances and non-hazardous pollutants; Priority Substances & Specific Pollutants).	Mid-Chilterns Chalk			2010	Predicted change to status elements (green = none, amber = possibly, red = likely)	There is potential for piling activities or construction dewatering to disperse or mobilise existing contamination. Effects expected to be localised. Detailed method statements will minimise the risk that contamination is mobilised or dispersed as a result of construction. CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime. No significant impact on overall groundwater quality predicted.	No significant pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Potential localised effects. Negligible impact following mitigation.	Potential localised effects. Negligible impact following mitigation.	None required	Potential localised effects. Negligible impact following mitigation.
Thames Groundwater Pollution Prevention project.	Mid-Chilterns Chalk			2010		Piling could create pathways between surface water or shallow groundwater and the Chalk aquifer leading to contamination of Chalk groundwater. CoCP and best practice for design (particularly selection of piling techniques), construction and operations reduce risks to water quality. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Potential localised effects. Negligible impact following mitigation.	Potential localised effects. Negligible impact following mitigation.	None required	Potential localised effects. Negligible impact following mitigation.
Comply with Pt 2a Contaminated Land Remediation Notice served to clean up bromate (and bromide) groundwater pollution plume.	Mid-Chilterns Chalk			2010		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impact predicted.	No significant impact predicted.	None required	No significant impact predicted.
Targeted Pollution Prevention campaign and advice to industry driven by groundwater pollution.	Mid-Chilterns Chalk			2012		There is potential for piling activities or construction dewatering to disperse or mobilise existing contamination. Effects expected to be localised. Detailed method statements will minimise the risk that contamination is mobilised or dispersed as a result of construction. CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime. No significant impact on overall groundwater quality predicted.	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Potential localised effects. Negligible impact following mitigation.	Potential localised effects. Negligible impact following mitigation.	None required	Potential localised effects. Negligible impact following mitigation.
Registrations (in conjunction with Standard Rules) - Implement new regulatory approach (via Environmental Permitting Regulations) arising from implementation of new Groundwater Directive (2006/116/EC).	Thames RBD			2012		RBMP measure insensitive to impact	RBMP measure insensitive to impact	No significant impact predicted.	No significant impact predicted.	None required	No significant impact predicted.
Appropriate policies in Local Development Plans to ensure protection of groundwater.	Mid-Chilterns Chalk			2010		RBMP measure insensitive to impact	RBMP measure insensitive to impact	No significant impact predicted.	No significant impact predicted.	None required	No significant impact predicted.
Improvements to 2 water company sewage treatment works to protect groundwater quality (PR09).	Mid-Chilterns Chalk			2015		RBMP measure insensitive to impact	RBMP measure insensitive to impact	No significant impact predicted.	No significant impact predicted.	None required	No significant impact predicted.
R&D on fate and transport of phosphate in groundwater to determine impact on surface water.	Thames RBD			2012		Localised impact on surface water / groundwater interaction between groundwater in the chalk and water in the River Colne due to construction dewatering and piling activity impacts on gravel deposits. However, impact likely to be negligible following implementation of CoCP and best practice.	No significant pollutant linkage to surface waters as scheme element above groundwater table and no dewatering proposed. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No significant impact predicted.	No significant impact predicted.	None required	No significant impact predicted.

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A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Cutting		Embankment			Green Tunnel		Viaduct	Other Key Structures	Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Wendover north cutting (CFA10)	Rocky Lane South Cutting (CFA10)	Small Dean Viaduct Southern Approach Embankment (CFA10)	Small Dean Viaduct Northern Approach Embankment (CFA10)	Stoke Mandeville South Embankment (CFA10)	Wendover cut-and-cover tunnel (CFA10)		Small Dean Viaduct and embankments (CFA10)	B4009 Nash Lee Road Overbridge (CFA10)				
						055-L1	051-L2	051-L3	053-L1	056-L1	053-L2		052-L1	056-S1				
GB40601G604100					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation		Construction & Operation	Construction & Operation				
Chiltern Chalk Scarp	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Reduction in groundwater contributions	Reduction in groundwater contributions	Reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions				
1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Probably Not At Risk	Good Ecological Status by 2015	**WFD classification elements** / **Predicted change to status elements (green = none, amber = possibly, red = likely)**	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impact	Remains Good Status	None required	Remains Good Status
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Good	Low	At Risk	Good Ecological Status by 2015		Minor change in baseflow to nearby springs and Stoke Brook predicted. Discharge of dewatering abstractions to surface water (Stoke Brook) 1km downstream of springs; there is no suitable discharge point further upstream. Spring and surface water flows potentially affected locally thus influencing surface water quality elements. Majority of Stoke Brook downstream of discharge point is on unproductive strata so probably surface water dominated. CoCP and best practice for design, construction and operations reduce risks to surface waters. Implementation of monitoring regime during construction.	Minor change in baseflow to nearby springs and associated streams predicted. Spring and surface water flows potentially affected locally thus influencing surface water quality elements. CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	Scheme element is at least 30m above maximum recorded groundwater levels. No impacts identified as result of scheme element.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Minor change in baseflow to nearby springs and associated stream (primarily Bear Brook / Wendover Brook) predicted. Discharge of dewatering abstractions during construction to Stoke Brook. Dewatering will be during construction prior to backfilling around tunnel. Spring and surface water flows potentially affected locally during construction, thus influencing surface water quality elements. ES estimates reduction in spring flow to be 20%. CoCP and best practice for design, construction and operations reduce risks to water quality. Implementation of monitoring regime during construction.	No measurable impacts on flow are anticipated since a sealed box will be constructed to form the green tunnel. There will be sufficient residual aquifer thickness to avoid permanent impacts on spring flows. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impacts predicted.	Groundwater-fed spring 380m north east of scheme. Shallow groundwater in head deposits but is not considered to be in direct hydraulic continuity with groundwater in bedrock. Scheme element predicted to be predominantly above groundwater level in bedrock. Any dewatering required during construction will be temporary and localised. CoCP and best practice for design, construction and operations reduce risks to water. No significant residual impacts predicted.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Combined impacts have the potential to have an adverse effect on the WFD element.	Remains Good Status	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater to maximise potential for recharge back to groundwater. Monitoring during construction	Remains Good Status
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs). To assess the impact of groundwater abstractions on the condition of GWDTEs.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		Minor change in baseflow to nearby springs and associated streams predicted. Discharge of dewatering abstractions during construction to surface water downstream of springs; there is no suitable discharge point further upstream. Dewatering will be during construction prior to backfilling around tunnel. Spring and surface water flows potentially affected locally thus influencing associated GWDTEs (Fen in LWS at World's End). CoCP and best practice for design, construction and operations reduce risks to GWDTEs. Implementation of monitoring regime during construction.	Minor change in baseflow to nearby springs and associated streams predicted. Spring and surface water flows potentially affected locally thus influencing associated GWDTEs (e.g. Fen in LWS at World's End). Impact downstream at Weston Turville Reservoir SSSI further downstream is assessed as being negligible. CoCP and best practice for design, construction and operations reduce risks to GWDTEs. Implementation of monitoring regime during construction.	Scheme element is at least 30m above maximum recorded groundwater levels. No impacts identified as result of scheme element.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Minor change in baseflow to nearby springs and associated streams predicted. Discharge of dewatering abstractions during construction to surface water downstream of springs. Dewatering will be during construction prior to backfilling around tunnel. South end of tunnel above water table. Spring and surface water flows. Impact downstream at Weston Turville Reservoir SSSI further downstream is assessed as being negligible in ES as the tributary fed by springs that might be affected by tunnel only feed into Reservoir during high flow periods. Fen in LWS at World's End may be influenced by combined effects with Wendover North Cutting. CoCP and best practice for design, construction and operations reduce risks to GWDTEs. Implementation of monitoring regime during construction.	No measurable impacts on flow at GWDTEs (e.g. Fen in LWS at World's End and Weston Turville Reservoir SSSI further downstream) are anticipated since a sealed box will be constructed to form the green tunnel. There will be sufficient residual aquifer thickness to avoid permanent impacts on spring flows. CoCP and best practice for design, construction and operations reduce risks to GWDTEs. Negligible impacts predicted.	Groundwater-fed spring 380m north east of scheme. Shallow groundwater in head deposits is not considered to be in direct hydraulic continuity with groundwater in bedrock. Scheme element predicted to be predominantly above groundwater level in bedrock. Any dewatering required during construction will be temporary and localised. CoCP and best practice for design, construction and operations reduce risks to water. No significant residual impacts predicted.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Combined impacts have the potential to have an adverse effect on the WFD element.	Remains Good Status	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater to maximise potential for recharge back to groundwater. Monitoring during construction	Remains Good Status
4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Poor	Low	Probably At Risk	Good Ecological Status by 2015		Cutting extends below water table and dewatering will be required. Dewatering during construction and operations. Water abstracted during dewatering will be returned to surface water (Stoke Brook) 1km down from springs and at very edge of GW body; there is no suitable discharge point further upstream. Adverse effect on water balance of groundwater body. No impact to PWS or private abstractions predicted as none located within 1km of scheme element.	Potential impact to groundwater flows will be a local impact that is unlikely to significantly affect the hydrogeological regime. No impact to PWS or private abstractions as none located within 1km of scheme element.	Scheme element is at least 30m above maximum recorded groundwater levels and therefore there is no potential for impact on water balance or groundwater flow.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	South end of tunnel above water table. Water abstracted during dewatering will be returned to surface water (Stoke Brook) 1km down from springs and at very edge of GW body . There could be localised disruption to private abstractions. Dewatering will be during construction prior to backfilling around tunnel. Track drainage will be discharge to the south of the tunnel. Adverse effect on water balance of groundwater body during construction. Implementation of monitoring to indicate if further mitigation for abstractions required.	Potential to impact groundwater flow at the northern part of the tunnel at approximately the cricket ground at Wendover northwards. Impact to groundwater flows will be locally impacted but unlikely to significantly affect the hydrogeological regime.	Shallow groundwater in head deposits but is not considered to be in direct hydraulic continuity with groundwater in bedrock. Scheme element predicted to be predominantly above groundwater level in bedrock. Any dewatering required during construction will be temporary and localised. Localised mounding of groundwater levels around piles may occur. There could be localised disruption to private abstractions with moderate impact. CoCP and best practice for design, construction and operations reduce risks to water. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	Combined impacts have the potential to have an adverse effect on the WFD element, which is already at Poor status.	No Significant Deterioration	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater to maximise potential for recharge back to groundwater. Monitoring during construction	No Significant Deterioration
Quantitative status	Poor															Poor		Poor

Groundwater body					Scheme Elements	Cutting		Embankment			Green Tunnel		Viaduct	Other Key Structures	Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Wendover north cutting (CFA10)	Rocky Lane South Cutting (CFA10)	Small Dean Viaduct Southern Approach Embankment (CFA10)	Small Dean Viaduct Northern Approach Embankment (CFA10)	Stoke Mandeville South Embankment (CFA10)	Wendover cut-and-cover tunnel (CFA10)		Small Dean Viaduct and embankments (CFA10)	B4009 Nash Lee Road Overbridge				
						055-L1	051-L2	051-L3	053-L1	056-L1	053-L2		052-L1	056-S1				
GB40601G604100					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation		Construction & Operation	Construction & Operation				
Chiltern Chalk Scarp	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	None identified.	None identified.	None identified.	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate				
1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Probably Not At Risk	Good Chemical Status by 2015	**WFD classification elements** / **Predicted change to status elements (green = none, amber = possibly, red = likely)**	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impact	Remains Good Status	None required	Remains Good Status
2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Good	Low	At Risk	Good Chemical Status by 2015		Minor change in baseflow to nearby springs and associated streams predicted. Discharge of dewatering abstractions to Stoke Brook 1km downstream of springs. Spring and surface water chemistry potentially affected locally thus influencing ecology. CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	Minor change in baseflow to nearby springs and associated streams predicted. Spring and surface water chemistry potentially affected locally thus influencing ecology. CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	Scheme element is at least 30m above maximum recorded groundwater levels. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Minor change in baseflow to nearby springs and associated streams predicted. Discharge of dewatering abstractions to Stoke Brook 1km downstream of springs. Spring and surface water chemistry potentially affected locally thus influencing ecology. CoCP and best practice for design, construction and operations reduce risks to water quality. Implementation of monitoring regime during construction.	Minor change in baseflow to nearby springs and associated streams predicted. Discharge of dewatering abstractions to Stoke Brook 1km downstream of springs. Spring and surface water chemistry potentially affected locally thus influencing ecology. CoCP and best practice for design, construction and operations reduce risks to water quality. Implementation of monitoring regime during construction.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Local influence on surface water chemistry due to minor changes to spring flows.	Remains Good Status	None required	Remains Good Status
3. GWDTEs. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTEs.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		Minor change in baseflow to nearby springs and associated streams predicted. Discharge of dewatering abstractions to surface water (Stoke Brook) 1km downstream of springs. Spring and surface water chemistry potentially affected locally thus influencing associated GWDTEs. CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	Minor change in baseflow to nearby springs and associated streams predicted. Spring and surface water chemistry potentially affected locally thus influencing associated GWDTEs. CoCP and best practice for design, construction and operations reduce risks. Implementation of monitoring regime during construction.	Scheme element is at least 30m above maximum recorded groundwater levels. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Minor change in baseflow to nearby springs and associated streams predicted. Discharge of dewatering abstractions to surface water (Stoke Brook) 1km downstream of springs. Spring and surface water chemistry potentially affected locally thus influencing associated GWDTEs. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Implementation of monitoring regime during construction.	Minor change in baseflow to nearby springs and associated streams predicted. Discharge of dewatering abstractions to surface water (Stoke Brook) 1km downstream of springs. Spring and surface water chemistry potentially affected locally thus influencing associated GWDTEs. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Implementation of monitoring regime during construction.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Local influence on GWDTEs due to minor changes to spring flows.	Remains Good Status	None required	Remains Good Status
4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	Low	Probably At Risk	Good Chemical Status by 2015		In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA and SPZ2. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	In DrWPA and SPZ2. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	In DrWPA and SPZ3. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA and near private abstractions. There could be localised disruption to private abstractions. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Implementation of monitoring to indicate if further mitigation for abstractions required. Negligible impact following mitigation.	In DrWPA and near private abstractions. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA and near private abstractions. There could be localised disruption to private abstractions. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Implementation of monitoring to indicate if further mitigation for abstractions required. Negligible impact following mitigation.	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Potential localised effect. No change in status predicted.	Remains Good Status	None required	Remains Good Status
5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Potential localised effect. No change in status predicted.	Remains Good Status	None required	Remains Good Status
Chemical status	Good															Good		Good
Overall status	Poor															Poor		Poor

B. Risk screening of potential to prevent future attainment of good WFD status

WFD classification element currently at less than good status	Current status			Status objective	Scheme Elements	Cutting		Embankment			Green Tunnel		Viaduct	Other Key Structures	Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Wendover north cutting (CFA10)	Rocky Lane South Cutting (CFA10)	Small Dean Viaduct Southern Approach Embankment (CFA10)	Small Dean Viaduct Northern Approach Embankment (CFA10)	Stoke Mandeville South Embankment (CFA10)	Wendover cut-and-cover tunnel (CFA10)		Small Dean Viaduct and embankments (CFA10)	B4009 Nash Lee Road Overbridge				
						055-L1	051-L2	051-L3	053-L1	056-L1	053-L2		052-L1	056-S1				
4. Water balance (quantitative)	Poor			Good Status by 2015	**Phase**	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation		Construction & Operation	Construction & Operation				
RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	**Where RBMP measure will happen**			**When RBMP measure will happen**	**Identified chemical impacts**	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Reduction in groundwater contributions	Reduction in groundwater contributions	Reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions				
Investigation to improve confidence in groundwater quantitative status result.	Chiltern Chalk Scarp			2010	**Predicted change to status elements (green = none, amber = possibly, red = likely)**	Impacts on groundwater body water balance and surface water flows locally due to dewatering.	Potential impact to groundwater flows will be a local impact that is unlikely to significantly affect the hydrogeological regime.	Scheme element is at least 30m above maximum recorded groundwater levels and therefore there is no potential for impact on water balance or groundwater flow.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Impacts on groundwater body water balance and surface water flows locally during construction due to dewatering.	Potential impact to groundwater flows will be a local impact that is unlikely to significantly affect the hydrogeological regime.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Impacts on groundwater body water balance and surface water flows locally due to dewatering.	Local impacts	Monitoring to confirm status	Local impacts
Investigation to verify risk of deterioration in groundwater quantitative status.	Chiltern Chalk Scarp			2011		Impacts on groundwater body water balance and surface water flows locally due to dewatering.	Potential impact to groundwater flows will be a local impact that is unlikely to significantly affect the hydrogeological regime.	Scheme element is at least 30m above maximum recorded groundwater levels and therefore there is no potential for impact on water balance or groundwater flow.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Impacts on groundwater body water balance and surface water flows locally during construction due to dewatering.	Potential impact to groundwater flows will be a local impact that is unlikely to significantly affect the hydrogeological regime.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Impacts on groundwater body water balance and surface water flows locally due to dewatering.	Local impacts	Monitoring to confirm status	Local impacts

Ref:
Environment Agency (2007) Thame and South Chilterns catchment abstraction licensing strategy - WRMU2 - Thame Unconfined Chalk and Upper Greensand
Environment Agency website; What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx
Environment Agency (2009) River Basin Management Plan - Thames River Basin District - Annex C Actions to deliver objectives

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Cutting						Embankment			Other Key Structures	Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Thames Valley Viaduct North Cutting (CFA11)		Waddesdon South Cutting (CFA12)		Waddesdon North Cutting (CFA12)		Bicester Road Embankment (CFA11 and CFA12)	Waddlesdon Embankment (CFA12)	Quainton South Embankment (CFA12)	A41 Bicester Road Overbridge				
GB40602G600700					Phase	Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
Headington Corallian	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTE's or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTE's or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTE's or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Reduction in groundwater contributions	Reduction in groundwater contributions	Reduction in groundwater contributions	Damming of groundwater flow and reduction in groundwater contributions				
WFD classification elements	Predicted change to status elements (green = none, amber = possibly, red = likely)																		
1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions	Good	Low	Not At Risk	Good Ecological Status by 2015		Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element.	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element.	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impacts identified.	Remains Good Status	None required	Remains Good Status
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Good	High	Not At Risk	Good Ecological Status by 2015		Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element.	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element.	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element.	No impacts identified as result of scheme element	Surface water bodies are culverted where crossed by scheme element. Perched groundwater may be present in head deposits. No significant impacts identified as result of scheme element.	No impacts identified as result of scheme element	Scheme element located on unproductive strata. Surface water bodies are culverted where crossed by scheme element. No significant impacts identified.	Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element.	No significant impacts identified.	Remains Good Status	None required	Remains Good Status
3. Groundwater Dependent Terrestrial Ecosystems (GWDTE's). To assess the impact of groundwater abstractions on the condition of GWDTE'S.	Good	Low	Probably At Risk	Good Ecological Status by 2015		Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element.	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element.	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element.	No impacts identified as result of scheme element	Majority of scheme element is on unproductive strata. Perched groundwater may be present in head deposits. No known GWDTEs in vicinity. No impacts identified as a result of scheme element.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element.	No significant impacts identified.	Remains Good Status	None required	Remains Good Status
4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element.	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element.	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering proposed. No impacts identified as result of scheme element.	No significant impacts identified.	Remains Good Status	None required	Remains Good Status
Quantitative status	Good																Good		Good

Groundwater body					Scheme Elements	Cutting						Embankment			Other Key Structures	Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Putlowes (Thames Valley Viaduct North) Cutting (CFA11)		Waddesdon South Cutting (CFA12)		Waddesdon North Cutting (CFA12)		Bicester Road Embankment (CFA11 and CFA12)	Waddlesdon Embankment (CFA12)	Quainton South Embankment (CFA12)	A41 Bicester Road Overbridge				
GB40602G600700					Phase	Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
Headington Corallian	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	None identified	None identified	None identified	Creating or altering of pathways along which existing poor quality groundwater can migrate				
WFD classification elements	Predicted change to status elements (green = none, amber = possibly, red = likely)																		
1. Saline or other intrusions. To identify groundwater bodies where intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions	Good	Low	Not At Risk	Good Chemical Status by 2015		Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering required. No impacts identified as result of scheme element.	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering required. No impacts identified as result of scheme element.	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. No dewatering required. No impacts identified as result of scheme element.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impacts identified.	Remains Good Status	None required	Remains Good Status
2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Good	Low	Not At Risk	Good Chemical Status by 2015		Scheme element will penetrate unproductive strata and not intercept groundwater. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	Majority of scheme element is on unproductive strata. Shallow groundwater may be present in head deposits and adjacent to watercourse. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element.	No impacts identified as result of scheme element	Majority of scheme element is on unproductive strata. Shallow groundwater may be present in superficial deposits along watercourse. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element.	In catchment of Fleet Marston Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No significant impacts identified.	Remains Good Status	None required	Remains Good Status
3. GWDTE's. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTE's.	Good	Low	Probably At Risk	Good Chemical Status by 2015		Scheme element will penetrate unproductive strata and not intercept groundwater. No known GWDTEs in hydraulic continuity. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. No known GWDTEs in hydraulic continuity. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	Scheme element will penetrate unproductive strata and not intercept groundwater. No known GWDTEs in hydraulic continuity. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	Majority of scheme element is on unproductive strata. Shallow groundwater may be present in head deposits and adjacent to watercourse. No known GWDTEs in vicinity. No impacts identified as a result of scheme element.	Scheme element is on unproductive strata. No known GWDTEs in hydraulic continuity. No significant impacts identified as result of scheme element	Majority of scheme element is on unproductive strata. Shallow groundwater may be present in superficial deposits along watercourse. LWSs located downstream. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No significant impacts identified.	Remains Good Status	None required	Remains Good Status
4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		In DrWPA. Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	No impacts identified as result of scheme element	In DrWPA. Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	No impacts identified as result of scheme element	In DrWPA. Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	No impacts identified as result of scheme element	In DrWPA. Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	In DrWPA. Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	In DrWPA. Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No significant impacts identified.	Remains Good Status	None required	Remains Good Status
5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	No impacts identified as result of scheme element	Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	No impacts identified as result of scheme element	Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	No impacts identified as result of scheme element	Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	Potential for impact to groundwater quality through the unsaturated zone during construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No significant impacts identified.	Remains Good Status	None required	Remains Good Status
Chemical status	Good																Good		Good
Overall status	Good																Good		Good

Ref:
Environment Agency (2007) Thame and South Chilterns abstraction licensing strategy - WRMU1 River Thame and unconfined Chalk
Environment Agency website; What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Cutting						Embankment						Viaduct		Other Key Structures		Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Molsbury Cutting (CFA014)		Turweston Cutting (CFA014)		Brackley South Cutting (CFA014)		Brackley North Cutting (CFA014)		Greatworth South Cutting (CFA015)		Molsbury Embankment (CFA014)	Westbury Embankment (CFA014)	Growthill Embankment (CFA014)	Turweston Embankment (CFA014)	Brackley Embankment (CFA014)	Greatworth South Embankment (CFA015)	Westbury Viaduct (CFA014)	Turweston Viaduct (CFA014)	A43 London Road Overbridge	A43 Oxford Road Overbridge				
GB405051G402300					Phase	091-L2		093-L1		097-L1		098-L1		099-L2		091-L1	092-L1	092-L3	095-L1	097-L1	098-L1	092-L2	095-L1	089-S2	096-S2				
						Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
Upper Bedford Ouse Oolite Principal 1	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	None identified	None identified	None identified	None identified	None identified	None identified	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions				
WFD classification elements	Good	High	Not At Risk	Good Ecological Status by 2015	Predicted change to status elements (green = none, amber = possible, red = likely)	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant effects	Remains at Good Status	None required	Remains at Good Status
1. Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.																													
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Good	High	Not At Risk	Good Ecological Status by 2015		Cutting within catchment of Ouse GB105033037860 adjacent to Oxhey Farm is within Rpt. baseflow may be locally affected over 1km stretch. Water returned to ground via attenuation ponds at either end of cutting. No change in status of designated surface water bodies predicted.	Cutting expected to be above water table so no impacts predicted.	Cutting within catchment of Ouse GB105033037860 and Ouse GB105033037880 adjacent to Oxhey Farm is within Rpt. baseflow may be locally affected over 1km stretch. Water returned to ground via attenuation ponds at either end of cutting. No change in status of designated surface water bodies predicted.	Superficial aquifers and upper bedrock aquifers divided. Some residual flow beneath cutting expected. Tributary of Ouse GB105033037860 adjacent to Oxhey Farm is within Rpt. baseflow may be locally affected over 1km stretch. No change in status of designated surface water bodies predicted.	Cutting within catchment of Radstone Brook GB105033037940 and Ouse GB105033037880. Cutting predicted to be above water table. No significant impacts identified as result of cutting. Drainage expected to be via ground or to local watercourses at ends of cutting. Potential for reduction in spring flows to tributary of Ouse to SW of cutting. Tributary affected by up to 60% reduction in spring flow. Significant impacts identified as a consequence during low flows. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Cutting within catchment of Radstone Brook GB105033037940 and Ouse GB105033037880. Cutting expected to be above water table so no impacts predicted.	Cutting within catchment of Radstone Brook GB105033037940. Cutting expected to be above water table. No significant impacts identified as result of scheme element	Cutting expected to be above water table. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Cutting near catchment divide between Ouse (Beds) GB105033037950 and Radstone Brook. Several springs in the vicinity, mostly issuing on contact between Whitchurch Sand Member and Upper Mudstone. Springs feed minor tributaries. Based on spring elevations, base of cutting estimated to be close to water table. No springs within estimated ZoI. Minor influence on spring flows and baseflow of tributaries predicted but effects localised. Abstracted water will be discharged to surface waters south of Hatch Copse (Radstone Brook catchment). CoCP and best practice for design, construction and operations reduce risks to water quality.	Cutting may modify catchment divide between Ouse Beds and Radstone Brook. Minor influence on spring flows and baseflow of tributaries estimated to be close to water table. Therefore impact on flow regime & baseflow limited.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Viaduct crosses Ouse GB105033037860. Creation of new preferential pathways within and between shallow and bedrock aquifers due to piling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. Changes in groundwater flow causing localised mounding close to the route. CoCP and best practice for design (particularly selection of piling method), construction and operations reduce risks to water quality. Implementation of monitoring regime. No significant effect on river predicted.	Viaduct crosses Ouse GB105033037880. Creation of new preferential pathways within and between shallow and bedrock aquifers due to piling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. Changes in groundwater flow causing localised mounding close to the route. CoCP and best practice for design (particularly selection of piling method), construction and operations reduce risks to water quality. Implementation of monitoring regime. No significant effect on river predicted.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant effects	Remains at Good Status	None required	Remains at Good Status
3. GWDTEs. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTEs.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		No national or local GWDTEs within 1km of scheme	No national or local GWDTEs within 1km of scheme	Adjacent to GWDTE (Turweston Manor Grassland LWS). Reduction in spring flows may locally influence groundwater quality due to reduced dilution. Cutting drainage discharged to attenuation ponds at either end of cutting. CoCP and best practice for design, construction and operations reduce risks to water quality.	Adjacent to GWDTE (Turweston Manor Grassland LWS). Reduction in spring flows may locally influence groundwater quality due to reduced dilution. Cutting drainage discharged to ground or surface waters. CoCP and best practice for design, construction and operations reduce risks to water quality.	Potential GWDTEs within 4km of cutting. Drainage expected to be locally inwards. Cutting unlikely to have significant impact on GWDTE. Cutting drainage discharged to ground or surface waters. CoCP and best practice for design, construction and operations reduce risks to groundwater quality.	Potential GWDTEs within 4km of cutting. Drainage expected to be locally inwards. Cutting unlikely to have significant impact on GWDTE.	Within 1km of Helmdon Disused Railway SSSI. Water table is close to the bottom of the existing cutting in SSSI. Scheme element expected to be above water table. No significant impacts identified as result of scheme element	Within 1km of Helmdon Disused Railway SSSI. Water table is close to the bottom of the existing cutting in SSSI. Scheme element expected to be above water table. No significant impacts identified as result of scheme element	Within 1km of Helmdon Disused Railway SSSI. Water table is close to the bottom of the existing cutting in SSSI. Scheme element expected to be above water table. No significant impacts identified as result of scheme element	Within 1km of Hatse Copse 1 and 2 Ancient Woodland, not identified as GWDTEs in EA.	Within 1km of Hatse Copse 1 and 2 Ancient Woodland, not identified as GWDTEs in EA.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Crosses GWDTE (Turweston Manor Grassland LWS). Site described as having springs, fen, marsh and swamp. Loss of habitat beneath scheme element footprint not assessed. Treatment of soft alluvium beneath embankment to be required to attenuation ponds either side of embankment. Minor influence on recharge locally but one is within floodplain. May have influence on shallow GW flow regime and baseflow to River Ouse which passes cross-strike aquifer. Mitigation through drainage design to reduce ponding of shallow GW on upstream side.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Within 1km of Helmdon Disused Railway SSSI. No significant impacts predicted.	No national or local GWDTEs within 1km of scheme	Crosses GWDTE (Turweston Manor Grassland LWS) as result of cutting. Site described as having springs, fen, marsh and swamp. Loss of habitat beneath scheme element footprint not assessed. Treatment of soft alluvium beneath embankment to be required to attenuation ponds either side of embankment. Minor influence on recharge locally but one is within floodplain. May have influence on shallow GW flow regime and baseflow to River Ouse which passes cross-strike aquifer. Mitigation through drainage design to reduce ponding of shallow GW on upstream side.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Localised effects on GWDTEs predicted.	Remains at Good Status	Reassess once site investigation & monitoring data available Monitoring during construction	Remains at Good Status
4. Groundwater Dependent Terrestrial Ecosystems (GWDTEs). To assess the impact of groundwater abstractions on the condition of GWDTEs.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		No national or local GWDTEs within 1km of scheme	No national or local GWDTEs within 1km of scheme	Adjacent to GWDTE (Turweston Manor Grassland LWS). Site described as having springs, fen, marsh and swamp. Located on alluvium and head deposits. LWS is downhill from cutting. Dewatering of Rdstone Brook GB105033037940 and Ouse GB105033037880 and Wetbeat located 800m downstream; outside Rpt but may still be influenced by partial interception of flows. Water returned to ground via attenuation ponds at either end of cutting. Implementation of groundwater monitoring regime.	Adjacent to GWDTE (Turweston Manor Grassland LWS). Site described as having springs, fen, marsh and swamp. Located on alluvium and head deposits. LWS is downhill from cutting, but base of cutting slopes away from LWS. Some residual flow beneath cutting expected. Turweston Carr and Wetbeat located 800m downstream; outside Rpt but may still be influenced by partial interception of flows. Implementation of groundwater monitoring regime.	Crosses Helmdon Disused Railway SSSI, not designated because of groundwater dependent features. Base of existing cutting is close to water table. Loss of section of SSSI beneath scheme element footprint not assessed. Scheme element extends c.4m beneath existing SSSI. Dewatering of existing cutting likely to be beneficial locally. Only section of SSSI within existing cutting likely to be affected; stretch on existing embankment across Radstone Brook within N north is assumed to be not groundwater dependent. Base of existing cutting is close to water table. Loss of section of SSSI beneath scheme element footprint not assessed. Till beneath LWS will help maintain groundwater levels associated with local lowering of groundwater levels. Within 1km of GWDTE (Turweston Manor Grassland LWS) but on opposite side of river; No impacts predicted.	Crosses Helmdon Disused Railway SSSI, not designated because of groundwater dependent features. Base of existing cutting is close to water table. Loss of section of SSSI beneath scheme element footprint not assessed. Scheme element extends c.4m beneath existing SSSI. Dewatering of existing cutting likely to be beneficial locally. Only section of SSSI within existing cutting likely to be affected; stretch on existing embankment across Radstone Brook within N north is assumed to be not groundwater dependent. Base of existing cutting is close to water table. Loss of section of SSSI beneath scheme element footprint not assessed. Till beneath LWS will help maintain groundwater levels associated with local lowering of groundwater levels. Within 1km of GWDTE (Turweston Manor Grassland LWS) but on opposite side of river; No impacts predicted.	Within 1km of Helmdon Disused Railway SSSI. Water table is close to the bottom of the existing cutting in SSSI. Scheme element expected to be above water table. No significant impacts identified as result of scheme element	Within 1km of Helmdon Disused Railway SSSI. Water table is close to the bottom of the existing cutting in SSSI. Scheme element expected to be above water table. No significant impacts identified as result of scheme element	Within 1km of Helmdon Disused Railway SSSI. Water table is close to the bottom of the existing cutting in SSSI. Scheme element expected to be above water table. No significant impacts identified as result of scheme element	Within 1km of Hatse Copse 1 and 2 Ancient Woodland, not identified as GWDTEs in EA.	Within 1km of Hatse Copse 1 and 2 Ancient Woodland, not identified as GWDTEs in EA.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Within 1km of Helmdon Disused Railway SSSI. No significant impacts predicted.	No national or local GWDTEs within 1km of scheme	Groundwater DrWPA is At Risk but no SPZs within 1km of scheme element. Creation of new preferential pathways within and between shallow and bedrock aquifers due to piling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. CoCP and best practice for design (particularly selection of piling method), construction and operations reduce risks to water quality. Implementation of monitoring regime.	Groundwater DrWPA is At Risk but no SPZs within 1km of scheme element. Creation of new preferential pathways within and between shallow and bedrock aquifers due to piling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. CoCP and best practice for design (particularly selection of piling method), construction and operations reduce risks to water quality. Implementation of monitoring regime.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Localised or temporary effects predicted. Transfer of groundwater between UBOOS and UBOOPI plus disposal of abstracted groundwater to surface waters. GWB which water balance considered to have sufficient capacity to avoid change in status	Remains at Good Status	None required	Remains at Good Status
5. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		Cutting expected to be above water table so no impacts predicted.	Cutting expected to be above water table so no impacts predicted.	Dewatering of superficial and bedrock aquifers required. Water returned to ground via attenuation ponds at either end of cutting. Water abstracted from UBOO Secondary to UBOO Principal by track drainage.	Superficial aquifers divided by cutting. Some residual flow beneath cutting. Some aquifer systems some residual flow beneath cutting expected. Local influence on flow regime in individual formations possible. Water transferred from UBOO Secondary to UBOO Principal by track drainage.	Dewatering of superficial and bedrock aquifers required. Water returned to ground or to local watercourses. Water transferred from UBOO Principal to UBOO Secondary by track drainage.	Dewatering of superficial and bedrock aquifers required. Water returned to ground or to local watercourses. Water transferred from UBOO Principal to UBOO Secondary by track drainage.	Cutting divides superficial aquifer. Cutting gradient may move groundwater divide northwards. Water transferred from UBOO Principal to UBOO Secondary by track drainage.	Cutting expected to be above water table so no impacts predicted.	Cutting expected to be above water table so no impacts predicted.	Cutting through Till, glaciofluvial sand and gravels, Great Oolite Group and inferior Oolite. Based on spring elevations, base of cutting estimated to be close to water table. Non-licenced abstraction to the north of the A43 route (n1020= 300, abstraction is spring-fed but is outside Rpt. Abstracted water will be discharged to surface waters at southern end.	Based on spring elevations, base of cutting estimated to be close to water table. Flow limited impact on groundwater flow regime expected.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Temporary and localised dewatering during construction. Abstracted water will be discharged to surface waters. Foundation piling may disrupt groundwater flow and cause minor obstruction to groundwater flow causing localised mounding close to the route.	Temporary and localised dewatering during construction. Abstracted water will be discharged to surface waters. Foundation piling may disrupt groundwater flow and cause minor obstruction to groundwater flow causing localised mounding close to the route.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	None required	Remains at Good Status
Quantitative status	Good																								Good		Good
Chemical status	Poor																								Poor		Poor
Overall status	Poor																								Poor		Poor

B. Risk screening of potential to prevent future attainment of good WFD status

WFD classification element currently at less than good status	Current status			Status objective	Scheme Elements	Cutting						Embankment						Viaduct		Viaduct		Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Molsbury Cutting (CFA014)		Turweston Cutting (CFA014)		Brackley South Cutting (CFA014)		Brackley North Cutting (CFA014)		Greatworth South Cutting (CFA015)		Molsbury Embankment (CFA014)	Westbury Embankment (CFA014)	Growthill Embankment (CFA014)	Turweston Embankment (CFA014)	Brackley Embankment (CFA014)	Greatworth South Embankment (CFA015)	Westbury Viaduct (CFA014)	Turweston Viaduct (CFA014)	Westbury Viaduct (CFA014)	Turweston Viaduct (CFA014)				
1. Saline or other intrusions (chemical)	Poor			Good Status by 2015	Phase	091-L2		093-L1		097-L1		098-L1		099-L2		091-L1	092-L1	092-L3	095-L1	097-L1	098-L1	092-L2	095-L1	092-L2	095-L1				
						Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
RBMP measures to achieve Good Status (as documented or confirmed as implemented)	**Where RBMP measure will happen**			**When RBMP measure will happen**	Identified chemical impacts	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	None identified	None identified	None identified	None identified	None identified	None identified	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate				
Negotiations (in conjunction with Standard Rules) - implement new regulatory approach (via Environmental Permitting Regulations) for the implementation of new Groundwater Directive (DWD/2006/118/EC).	Anglian RBD			2012	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	No significant impacts	No significant impacts	None required	No significant impacts
R&D on fate and transport of phosphate groundwater to determine impact on surface water.	Anglian RBD			2012	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	No significant impacts	No significant impacts	None required	No significant impacts
Local urban partnerships / Local campaigns - educational.	Upper Bedford Ouse Oolite Principal 1			2010	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	No significant impacts	No significant impacts	None required	No significant impacts

Ref:
Environment Agency (2010S) Upper Ouse and Bedford Ouse abstraction licensing strategy - AP19 Buckingham and AP20 Twins and Oolite Unconfined GWMU 2
Environment Agency website. What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx
Environment Agency (2009) River Basin Management Plan - Anglian River Basin District - Annex 2 Actions to deliver objectives

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Cutting				Embankment			Green Tunnel		Other Key Structures			Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Chetwode Cutting (CFA13)		Barton to Mixbury Cutting (CFA13 and CFA14)		Greatworth North Cutting (CFA15)		Barton Hartshorne Embankment (CFA13)	Helmdon Embankment (CFA14)	Greatworth North Embankment (CFA15)	Greatworth Green Tunnel (CFA15)		A4421 Buckingham Road Overbridge	A422 Brackley Road Overbridge	Helmdon Road Realignment				
						084-L2		087-L2		101-L2		086-L1	095-L3	101-L1	101-L3		088-S1	093-S2	101-S2				
GB40502G401300					Phase	Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation				
Upper Bedford Ouse Oolite Secondary	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Reduction in groundwater contributions	Reduction in groundwater contributions	Reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Damming of groundwater flow and reduction in groundwater contributions	Damming of groundwater flow and reduction in groundwater contributions	Damming of groundwater flow and reduction in groundwater contributions				
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)																		
1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Not At Risk	Good Ecological Status by 2015		No likely saline or other intrusion of poor quality water as a result of dewatering.	No impacts identified as result of scheme element	No likely saline or other intrusion of poor quality water as a result of dewatering.	No impacts identified as result of scheme element	No likely saline or other intrusion of poor quality water as a result of dewatering.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No likely saline or other intrusion of poor quality water as a result of dewatering.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impacts predicted	Remains at Good Status	None required	Remains at Good Status
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Good	High	Not At Risk	Good Ecological Status by 2015		Majority of cutting expected to be above water table. Close to tributary of Padbury Brook (GB105031038210). Majority of cutting expected to be above water table. Minor impact to flow in groundwater fed spring south-west of Rosehill Farm, Chetwode as a result of dewatering superficial and bedrock aquifers. Localised impact on flow regime. Water intercepted in the cutting will be collected by track drainage and discharged to nearby detention ponds or to watercourses.	Close to tributary of Padbury Brook (GB105031038210). Majority of cutting expected to be above water table. Minor impact to flow in groundwater fed spring south-west of Rosehill Farm, Chetwode as a result of dewatering superficial and bedrock aquifers. Localised impact on flow regime. Water intercepted in the cutting will be collected by track drainage and discharged to nearby detention ponds or to watercourses.	Majority of cutting above water table. Southern part of cutting in Padbury Brook catchment. Northern part of cutting in River Ouse catchment. Intercepted groundwater during construction would be discharged into the minor watercourses at both ends. Track drainage will discharge at N end of cutting, moving water from Padbury Brook catchment to River Ouse catchment. Groundwater flow to springs to the north of Manor Farm, Barton Hartshorn and issues south west of Garden Cottages will not be disturbed by the cutting as they will be fed from the higher groundwater to the north.	Southern part of cutting in Padbury Brook catchment. Northern part of cutting in River Ouse catchment. Majority of cutting expected to be above water table. Intercepted groundwater during construction would be discharged into the minor watercourses at both ends. Track drainage will discharge at N end of cutting, moving water from Padbury Brook catchment to River Ouse catchment. Groundwater flow to springs to the north of Manor Farm, Barton Hartshorn and issues south west of Garden Cottages will not be disturbed by the cutting as they will be fed from the higher groundwater to the north.	In catchment of Ouse (Beds). Cutting expected to be predominantly above water table. May extend locally up to 4m below water table. Potential for flow in spring located 150m south-west of the route to be reduced as groundwater that would naturally flow to these springs would be drawn towards the cutting. Track and land drainage will be discharged to the spring 150m south-west of the route via attenuation ponds. Implementation of monitoring plan, with appropriate remedial action being taken if required.	Cutting expected to be predominantly above water table. May extend locally up to 4m below water table. However, unlikely to influence wider flow regime and no receptors identified within calculated RoI. Track and land drainage will be discharged to the spring 150m south-west of the route via attenuation ponds. Implementation of monitoring plan, with appropriate remedial action being taken if required.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Located on catchment divide between Radstone Brook, Ouse Beds, Cherwell and Farthinghoe. During construction, dewatering may reduce spring flows at Painters Spinney, in catchment of Helmdon Brook. Possible slight temporary influence on other springs downhill from tunnel during construction, although these springs are all outside predicted RoI. No permanent dewatering required post-construction. Minor influence on geometry of catchment divide. Implementation of water monitoring plan, with appropriate remedial action being taken if required.	Following construction and backfilling around the cut-and-cover tunnel, impact on spring flows will be reduced. Route generally follow a ridgeline and therefore anticipated that the route will be close to the line of a natural groundwater divide. In most cases obstruction to groundwater flow unlikely to have significant impact on spring flows. Implementation of monitoring plan, with appropriate remedial action being taken if required.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Localised / temporary impacts predicted. Further assessment of combined impacts on surface water catchments, in conjunction with assessment for adjacent UBOOP1 GWB, required, particularly for Radstone Brook and Ouse.	Remains at Good Status	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater to maximise potential for recharge back to groundwater. Monitoring during construction	Remains at Good Status
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs). To assess the impact of groundwater abstractions on the condition of GWDTEs.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		No groundwater dependent ecosystems (GWDTEs) identified in vicinity of scheme element so no impact identified.	No groundwater dependent ecosystems (GWDTEs) identified in vicinity of scheme element so no impact identified.	No groundwater dependent ecosystems (GWDTEs) identified in vicinity of scheme element so no impact identified.	No groundwater dependent ecosystems (GWDTEs) identified in vicinity of scheme element so no impact identified.	No groundwater dependent ecosystems (GWDTEs) identified in vicinity of scheme element so no impact identified.	No groundwater dependent ecosystems (GWDTEs) identified in vicinity of scheme element so no impact identified.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Reduction of groundwater flow to groundwater fed streams within catchment of River Cherwell during construction. River Cherwell has been identified as a groundwater dependent habitat. However, drainage from the cutting during construction likely to be discharged to nearby watercourses which feed into the River Cherwell. No significant impacts on Cherwell predicted.	Contribution to groundwater fed springs which feed into the River Cherwell are likely to be reinstated following the covering of the cut-and-cover tunnel.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Localised / temporary impacts	Remains at Good Status	None required	Remains at Good Status
4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		Majority of cutting expected to be above water table. No licensed abstractions within 1km. Drainage from the cutting will be discharged to local surface watercourses via detention ponds.	Majority of cutting expected to be above water table. No significant impacts predicted.	Majority of cutting expected to be above water table. Intercepted groundwater would be discharged into attenuation pond then the minor watercourses. Groundwater may be transferred from UBOO Secondary to UBOO Principal GW body by track drainage systems.	Majority of cutting expected to be above water table. Groundwater may be transferred from UBOO Secondary to UBOO Principal GW body by track drainage systems.	Cutting expected to be predominantly above water table. May extend locally up to 4m below water table. Track and land drainage will be discharged to the spring 150m south-west of the route via attenuation ponds.	Cutting expected to be predominantly above water table. May extend locally up to 4m below water table. However, unlikely to influence wider groundwater regime.	Potential reduction in groundwater recharge due to deposition of material minimal and will be mitigated by collection of route drainage to ditches and swales for infiltration back to groundwater.	Potential reduction in groundwater recharge due to deposition of material minimal and will be mitigated by collection of route drainage to ditches and swales for infiltration back to groundwater.	Potential reduction in groundwater recharge due to deposition of material minimal and will be mitigated by collection of route drainage to ditches and swales for infiltration back to groundwater.	Groundwater is likely to be intercepted as base of cutting is below anticipated groundwater level. Dewatering during construction will have a local impact on water balance; water returned to ground via SuDS. Water from N end likely to be discharged into Byfield Jurassic GWB. Reduction in spring flows at Painters Spinney predicted.	No significant impacts predicted post-backfilling.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	Localised / temporary impacts predicted. Transfer of groundwater between UBOOS and UBOOP1 & Byfield Jurassic GWBs plus disposal of abstracted groundwater to surface waters. GWB current water balance considered to have sufficient capacity to avoid change in status.	Remains at Good Status	None required	Remains at Good Status
Quantitative status	**Good**																				Good		Good

Groundwater body					Scheme Elements	Cutting				Embankment			Green Tunnel		Other Key Structures			Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Chetwode Cutting (CFA13)		Barton to Mixbury Cutting (CFA13 and CFA14)		Greatworth North Cutting (CFA15)		Barton Hartshorne Embankment (CFA13)	Helmdon Embankment (CFA14)	Greatworth North Embankment (CFA15)	eatworth Cut-and-cover tunnel (CFA15)		A4421 Buckingham Road Overbridge	A422 Brackley Road Overbridge	Helmdon Road Realignment				
						084-L2		087-L2		101-L2		086-L1	095-L3	101-L1	101-L3		088-S1	093-S2	101-S2				
GB40502G401300					Phase	Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation				
Upper Bedford Ouse Oolite Secondary	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	None identified	None identified	None identified	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate				
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)																		
1. Saline or other intrusions. To identify groundwater bodies where intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Not At Risk	Good Chemical Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impacts predicted	Remains at Good Status	None required	Remains at Good Status
2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Good	High	Not At Risk	Good Chemical Status by 2015		Local impacts on spring flows into tributaries. Water intercepted in the cutting will be collected by track drainage and discharged to nearby detention ponds or to watercourses. CoCP and best practice for design, construction and operations reduce risks to water quality.	Water intercepted in the cutting will be collected by track drainage and discharged to nearby detention ponds or to watercourses. CoCP and best practice for design, construction and operations reduce risks to water quality.	Intercepted groundwater would be discharged into the minor watercourses. Implementation of CoCP will mitigate against any pollutant link to surface water during construction.	The Barton to Mixbury cutting is likely to intercept groundwater in the Oolite and superficial deposits and draw groundwater into the cutting instead of discharging as baseflow in minor watercourses. Intercepted groundwater would be discharged into the minor watercourses. CoCP and best practice for design, construction and operations reduce risks to water quality.	Track and land drainage would be discharged to minor watercourse via attenuation ponds. CoCP and best practice for design, construction and operations reduce risks to water quality.	Track and land drainage would be discharged to minor watercourse via attenuation ponds. CoCP and best practice for design, construction and operations reduce risks to water quality.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	During construction, dewatering may reduce spring flows at Painters Spinney, in catchment of Helmdon Brook. Implementation of monitoring plan. CoCP and best practice for design, construction and operations reduce risks to water quality.	Following construction and backfilling around the cut-and-cover tunnel, impact on spring flows will be reduced. Route generally follow a ridgeline and therefore anticipated that the route will be close to the line of a natural groundwater divide. In most cases obstruction to groundwater flow unlikely to have significant impact on spring flows. Implementation of monitoring plan. CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In catchment of River Ouse. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In catchment of Helmdon Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Localised / temporary impacts	Remains at Good Status	None required	Remains at Good Status
3. GWDTEs. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTEs.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		No groundwater dependent ecosystems (GWDTEs) identified in vicinity of scheme element so no impact identified.	No groundwater dependent ecosystems (GWDTEs) identified in vicinity of scheme element so no impact identified.	No groundwater dependent ecosystems (GWDTEs) identified in vicinity of scheme element so no impact identified.	No groundwater dependent ecosystems (GWDTEs) identified in vicinity of scheme element so no impact identified.	No groundwater dependent ecosystems (GWDTEs) identified in vicinity of scheme element so no impact identified.	No groundwater dependent ecosystems (GWDTEs) identified in vicinity of scheme element so no impact identified.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Reduction of groundwater flow to groundwater fed streams likely to impact contribution to River Cherwell during construction which has been identified as a groundwater dependent habitat. CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Localised / temporary impacts	Remains at Good Status	None required	Remains at Good Status
4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	Low	Probably At Risk	Good Chemical Status by 2015		In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA and private abstraction from a spring source located 600m from the route. During construction the green tunnel will act as a sink drawing in water which may alter the groundwater divide between the cutting and the abstraction, however it will no longer act as a sink once complete. Potential for impact to groundwater quantity and quality at the abstraction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality.	Backfill around tunnel. In DrWPA and private abstraction from a spring source located 600m from the route. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Localised / temporary impacts	Remains at Good Status	None required	Remains at Good Status
5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Localised / temporary impacts	Remains at Good Status	None required	Remains at Good Status
Chemical status	**Good**																				Good		Good
Overall status	**Good**																				Good		Good

Ref:
Environment Agency (2005) Upper Ouse and Bedford Ouse catchment abstraction licensing strategy - Oolite Unconfined GWMU2, AP17 - Tove, AP19 - Buckingham and AP20 - Twins
Environment Agency website; What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Cutting								Embankment				Green Tunnel		Viaduct	Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Thorpe Mandeville Cutting (CFA015)		Lower Thorpe South Cutting (CFA015)		Lower Thorpe North Cutting (CFA015)		Culworth Cutting (CFA015)		Edgcote Cutting (CFA015)		Thorpe Mandeville Embankment (CFA015)	Lower Thorpe Embankment (CFA015)	Edgcote Battlefield Embankment (CFA015)	Edgcote Embankment South (CFA015)	Chipping Warden Green Tunnel (CFA015)		Lower Thorpe Viaduct (CFA015)				
						104-L1		105-L2		105-L4		107-L1		108-L3		104-L2	105-L3	106-L1	107-L2	109-L1		105-L1				
GB40602G604200					Phase	Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation		Construction & Operation				
Byfield Jurassic	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	None identified	None identified	None identified	None identified	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions				
WFD classification elements					Predicted change to status elements (green = none, amber = possible, red = likely)																					
1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions	Good	High	Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impacts identified	Remains at Good Status	None required	Remains at Good Status
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Good	High	Not At Risk	Good Ecological Status by 2015		Close to River Cherwell (GB106039037350) including minor tributaries. The cutting may affect springs and spring fed watercourses either side of the route. These springs are generally along the outcrop of the underlying Whitby Mudstone. Flow in springs near Costow House likely to be influenced, affecting Culworth Brook. Drainage water would be discharged to Culworth Brook downstream, meaning effects would be localised. No change in status of Cherwell expected. However, flows in upper 800mof watercourse may be affected. Implementation of monitoring plan.	Route of cutting will isolate a small area of Northampton Sand Formation (secondary aquifer), cutting it off from flow regime in rest of aquifer. This may affect local spring flows and thus watercourses. Drainage from cutting to be discharged to surface waters, so impacts localised.	Close to River Cherwell (GB106039037350) including a minor tributary. Shallow (1.4m) cutting in Whitby Mudstone Formation. Contribution of mudstone to local baseflow expected to be limited. Limited dewatering requirements. Not significant impacts identified.	Cutting is in mudstone. Possible localised influence on flow regime. No significant impacts identified.	Close to a minor tributary of the River Cherwell (GB106039037350). Cutting predominantly in Whitby Mudstone Formation. Contribution of mudstone to local baseflow expected to be limited. Track drainage transfers water from upstream to downstream part of same catchment.	Cutting is in mudstone. Possible localised influence on flow regime. No significant impacts identified.	Close (200m) to a tributary of the River Cherwell (GB106039037350) but cutting is in mudstone. Contribution of mudstone to local baseflow expected to be limited. Limited dewatering expected to be required. No significant impacts identified.	Cutting is in mudstone. Possible localised influence on flow regime. No significant impacts identified.	Cutting is 300m from River Cherwell (GB106039037350) and >100m from a tributary. Potential for cutting to affect flows in the Marlstone Rock / Dyrham, with interception of springs feeding local surface water courses. Baseflow and spring flow to the tributary of the Cherwell to the northeast of the cutting may be reduced. Track drainage will be discharged to the River Cherwell and some of its tributaries via attenuation ponds. No impact on flows in Cherwell itself predicted.	Cutting will have localised influence on groundwater flow regime, which will influence spring flows and baseflow in adjacent watercourses.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Potential to affect flows in the Marlstone Rock & Dyrham Formations, with interception of springs feeding local surface water courses (tributaries of Highfurlong Brook and River Cherwell). Groundwater divide is located towards northern end of tunnel. Baseflow and spring flow to the tributary of the Cherwell to the northeast of the cutting may be reduced. Pond close to Calves Close Spinney may be influenced by local drawdowns in water table. Track drainage will be discharged to the River Cherwell and some of its tributaries via attenuation ponds. Impacts associated with tunnel dewatering are temporary during construction.	Excavation will be backfilled around tunnel. Minor local influence on groundwater flow regime due to presence of tunnel. No significant impact on surface water flows predicted.	Crosses River Cherwell (GB106039037350). On Whitby Mudstone, and possible local alluvium with shallow groundwater near river. Dewatering, if required, will be temporary and localised. Abstracted water returned to groundwater via infiltration or re-injection or to adjacent stretch of surface water body. Localised mounding of groundwater around piles may occur. Impact temporary and localised	Local or temporary impacts predicted. However, combined impacts have the potential to have an adverse effect, particularly with respect to combined effects on River Cherwell.	Remains at Good Status	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater to maximise potential for recharge back to groundwater. Monitoring during construction	Remains at Good Status
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs). To assess the impact of groundwater abstractions on the condition of GWDTEs.	Good	High	Not At Risk	Good Ecological Status by 2015		Flow in springs near Costow House likely to be influenced, affecting Culworth Brook. Drainage water would be discharged to Culworth Brook downstream. Costow Fields are a fen habitat and so are potential GWDTE (not designated site). Changes in spring flow and downstream discharge to watercourse may locally influence water levels within the fen.	Flow in springs near Costow House likely to be influenced, affecting Culworth Brook. Costow Fields are a fen habitat and so are potential GWDTE. Changes in spring flow may locally influence water levels within the fen.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Trafford Bridge Marsh LWS is downhill from this cutting but probably not in direct hydraulic connection with scheme element via groundwater as cutting is within Whitby Mudstone Formation. However, discharge of abstracted water may create pathway. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Cutting is in mudstone. Possible localised influence on flow regime. No significant impacts identified.	Trafford Bridge Marsh LWS is downhill from this cutting but probably not in direct hydraulic connection via groundwater as cutting is within Whitby Mudstone Formation. However, discharge of abstracted water may create pathway. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Cutting will have localised influence on groundwater flow regime, which will influence spring flows and baseflow in adjacent watercourses.	No impacts identified as result of scheme element	Pond habitat at Lower Thorpe partially lost to scheme. Mitigation through creation of replacement pond and drainage design.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Trafford Bridge Marsh LWS is downhill from the tunnel. Tunnel dewatering (combined with dewatering of Edgcote Cutting) may reduce local spring flows into marsh. Impact will be partially offset by drainage being discharged to the River Cherwell and some of its tributaries via attenuation ponds. Pond close to Calves Close Spinney may be influenced by local drawdowns in water table. CoCP and best practice for design, construction and operations reduce risks to GWDTE. No significant residual impacts identified as result of scheme element. Impacts associated with tunnel dewatering are temporary during construction.	No impacts identified as result of scheme element	Pond habitat at Lower Thorpe partially lost to scheme. Mitigation through creation of replacement pond and drainage design.	Localised effects on GWDTEs predicted.	Remains at Good Status	Reassess once site investigation & monitoring data available Monitoring during construction	Remains at Good Status
4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		Cutting intersects Horsehay Sand Formation and Northampton Sand Formation (secondary aquifers), with Whitby Mudstone at or near base level. Dewatering of cutting may have adverse impact on water balance of local aquifers as water to be discharged to surface waters (Cherwell catchment) via attenuation pond.	Route of cutting will isolate a small area of Northampton Sand Formation (secondary aquifer) cutting it off from flow regime in rest of aquifer.	Shallow (1.4m) cutting in Whitby Mudstone Formation, designated as unproductive strata. Limited dewatering requirements anticipated. No significant impacts identified.	Cutting is in mudstone. Possible localised influence on flow regime. No significant impacts identified.	Cutting predominantly in Whitby Mudstone Formation (unproductive strata) but central stretch is adjacent to hill of Northampton Sand Formation (Secondary bedrock aquifer) to the northeast. Abstracted water discharged to surface water body. Slight adverse impact on water balance.	Cutting is in mudstone. Possible localised influence on flow regime. No significant impacts identified.	Cutting is in Whitby Mudstone Formation, designated as unproductive strata. Limited dewatering expected to be required. Abstracted water discharged to surface water body. No significant impact predicted.	Cutting is in mudstone. Possible localised influence on flow regime. No significant impacts identified.	Cutting is in Marlstone. Abstracted water discharged to surface waters. Abstracted water discharged to surface waters via attenuation pond within Banbury Jurassic GWB so may have adverse impact on water balance of local aquifers.	Cutting will have localised influence on groundwater flow regime. No significant impacts identified	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Slewatering during construction from Marlstone Rock and Dyrham Formations (secondary aquifers). Abstractions along the ridge at Appletree Farm that abstract from Dyrham Formation. During construction there could be an impact to flows. Implement groundwater monitoring regime during construction to determine if further mitigation required (alternative water source for farm). CoCP and best practice for design, construction and operations reduce risks to groundwater. Abstracted water discharged to surface waters via attenuation pond so temporary adverse impact on water balance of local aquifers.	Excavation will be backfilled around tunnel. Tunnel will have localised influence on groundwater flow regime. No significant impacts identified	On Whitby Mudstone, and possible local alluvium with shallow groundwater near river. Dewatering, if required, will be temporary and localised. Abstracted water returned to groundwater via infiltration or re-injection or to adjacent stretch of surface water body. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Local or temporary impacts predicted. Combined impacts have the potential to have an adverse effect on the WFD element as some groundwater being discharged to surface waters or to other groundwater bodies. Current water balance for GWB is at Good status but has limited spare capacity.	Remains at Good Status	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater to maximise potential for recharge back to groundwater. Monitoring during construction	Remains at Good Status
Quantitative status	Good																					Good			Good	

Groundwater body					Scheme Elements	Cutting								Embankment				Green Tunnel		Viaduct	Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Thorpe Mandeville Cutting (CFA015)		Lower Thorpe South Cutting (CFA015)		Lower Thorpe North Cutting (CFA015)		Culworth Cutting (CFA015)		Edgcote Cutting (CFA015)		Thorpe Mandeville Embankment (CFA015)	Lower Thorpe Embankment (CFA015)	Edgcote Battlefield Embankment (CFA015)	Edgcote Embankment South (CFA015)	Chipping Warden Green Tunnel (CFA015)		Lower Thorpe Viaduct (CFA015)				
						104-L1		105-L2		105-L4		107-L1		108-L3		104-L2	105-L3	106-L1	107-L2	109-L1		105-L1				
GB40602G604200					Phase	Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation		Construction & Operation				
Byfield Jurassic	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate				
WFD classification elements					Predicted change to status elements (green = none, amber = possible, red = likely)																					
1. Saline or other intrusions. To identify groundwater bodies where intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions	Good	High	Not At Risk	Good Chemical Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impacts identified	Remains at Good Status	None required	Remains at Good Status
2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Good	Low	Not At Risk	Good Chemical Status by 2015		Changes in springs and baseflow in headwaters may influence surface water chemistry locally. Dewatering will be discharged to Culworth Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Potential for cutting to affect flows in Culworth Brook, with interception of springs. Changes in baseflow may influence surface water chemistry locally in upper 800m of watercourse. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Discharge of abstracted water may create pathway. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant residual impacts identified as result of scheme element	Discharge of abstracted water may create pathway. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant residual impacts identified as result of scheme element	Discharge of abstracted water may create pathway. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant residual impacts identified as result of scheme element	Discharge of abstracted water may create pathway. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant residual impacts identified as result of scheme element	Potential for cutting to affect flows in the Marlstone Rock / Dyrham, with interception of springs feeding local surface water courses. Cutting and track drainage will be discharged to the River Cherwell and some of its tributaries via attenuation ponds. Changes in baseflow may influence surface water chemistry locally. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Potential for cutting to affect flows in the Marlstone Rock / Dyrham, with interception of springs feeding local surface water courses. Changes in baseflow may influence surface water chemistry locally. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Tunnel dewatering (combined with dewatering of Edgcote Cutting) may reduce local spring flows. Impact will be partially offset by drainage being discharged to the River Cherwell and some of its tributaries via attenuation ponds. CoCP and best practice for design, construction and operations reduce risks to surface waters. No significant residual impacts identified as result of scheme element.	Excavation will be backfilled around tunnel. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Localised or temporary effects	Remains at Good Status	None required	Remains at Good Status
3. GWDTEs. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTEs.	Good	High	Not At Risk	Good Chemical Status by 2015		Flow in springs near Costow House likely to be influenced, affecting Culworth Brook. Costow Fields are a fen habitat and so are potential GWDTE (not designated site). Drainage water would be discharged to Culworth Brook downstream of current springs. Changes in spring flow may influence water quality in fen habitat locally. CoCP and best practice for design, construction and operations reduce risks to GWDTE. No significant impacts identified as result of scheme element	Costow Fields are a fen habitat and so are potential GWDTE. Drainage water would be discharged to Culworth Brook downstream from current springs. CoCP and best practice for design, construction and operations reduce risks to GWDTE. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Trafford Bridge Marsh LWS is downhill from this cutting but probably not in direct hydraulic connection via groundwater as cutting is within Whitby Mudstone Formation. However, discharge of abstracted water may create pathway. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Trafford Bridge Marsh LWS is downhill from this cutting but probably not in direct hydraulic connection via groundwater as cutting is within Whitby Mudstone Formation. However, discharge of abstracted water may create pathway. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Trafford Bridge Marsh LWS is downhill from the cutting. Cutting and track drainage will be discharged to the River Cherwell and some of its tributaries via attenuation ponds. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant residual impacts identified as result of scheme element.	Trafford Bridge Marsh LWS is downhill from the cutting. Cutting and track drainage will be discharged to the River Cherwell and some of its tributaries via attenuation ponds. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant residual impacts identified as result of scheme element.	No impacts identified as result of scheme element	Pond habitat at Lower Thorpe partially lost to scheme. Mitigation through creation of replacement pond and drainage design.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Trafford Bridge Marsh LWS is downhill from the tunnel. Tunnel dewatering (combined with dewatering of Edgcote Cutting) may reduce local spring flows into marsh. Impact will be partially offset by drainage being discharged to the River Cherwell and some of its tributaries via attenuation ponds. CoCP and best practice for design, construction and operations reduce risks to GWDTE. No significant residual impacts identified as result of scheme element.	Excavation will be backfilled around tunnel. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Pond habitat at Lower Thorpe partially lost to scheme. Mitigation through creation of replacement pond and drainage design.	Localised or temporary effects	Remains at Good Status	None required	Remains at Good Status
4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	High	Probably Not At Risk	Good Chemical Status by 2015		In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. Abstractions along the ridge at Appletree Farm that abstract from Dyrham Formation may be affected during construction. Implement groundwater monitoring regime during construction to determine if further mitigation required (alternative water source for farm). CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA with nearby groundwater abstractions. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Localised or temporary effects	Remains at Good Status	None required	Remains at Good Status
5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Localised or temporary effects	Remains at Good Status	None required	Remains at Good Status
Chemical status	Good																					Good			Good	
Overall status	Good																					Good			Good	

Ref:
Environment Agency (2005) Cherwell catchment abstraction licensing strategy - WRMU1 - Upper Cherwell and WRMU2 - Lower Cherwell
Environment Agency website; What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Cutting				Embankment				Viaduct		Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Lower Boddington Cutting (CFA015)		Boddington Cutting (CFA015 / CFA016)		Edgcote Embankment North (CFA015)	Aston Le Walls Embankment (CFA015)	Highfurlong Brook Embankment	Lower Boddington Embankment (CFA015)	Edgcote Viaduct (CFA015)	Highfurlong Brook Viaduct (CFA015)				
						113-L2		113-L2		108-L2	112-L2	113-L1	114-L1	108-L1	112-L3				
GB40602G600200					Phase	Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
Banbury Jurassic	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	None identified	None identfied	None identified	None identified	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions				
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)														
1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	Low	Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified	Remains Good Status	None required	Remains Good Status
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Good	Low	Not At Risk	Good Ecological Status by 2015		Cutting crosses minor tributary of the Boddington Feeder of the Oxford Canal. Cutting is 600m from the Highfurlong Brook (GB106039042660). Cutting is shallow (3m) and in Charmouth Mudstone, designated as unproductive strata. Limited dewatering may be required. No significant impacts predicted.	No significant impacts as cutting is in mudstone.	Southern section is adjacent (<100m) to minor tributaries of the Boddington Feeder to the Oxford Canal. Northern section is close (350m) to headwaters of tributary of River Itchen (GB109054044070) [watercourse is in Warwickshire Avon - Secondary Mudstone GWB]. Oxford Canal is assumed not to be in hydraulic connection with groundwater. Potential to affect watercourses and two ponds with in the vicinity of the cutting but impact will be limited as the cutting is in mudstone.	No significant impacts as cutting is in mudstone.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Viaduct is over River Cherwell (GB106039037350) and its tributaries. Groundwater likely to be in alluvium and in bedrock aquifers. Dewatering will be temporary and localised. Abstracted water returned to groundwater via infiltration or re-injection or to adjacent stretch of surface water body. Localised mounding of groundwater around piles may occur. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Viaduct is over Highfurlong Brook (GB106039042650). Groundwater likely to be present in alluvium. Bedrock is mudstone. Dewatering will be temporary and localised. Abstracted water returned to groundwater via infiltration or re-injection or to adjacent stretch of surface water body. Localised mounding of groundwater around piles may occur. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Localised /temporary effects	Remains Good Status	None required	Remains Good Status
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs). To assess the impact of groundwater abstractions on the condition of GWDTEs.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Close to Trafford Bridge Marsh LWS. No significant impacts to groundwater body status identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Close to/ crosses Trafford Bridge Marsh LWS. Upper Cherwell at Trafford House SSSI is 1.4km from scheme element (upstream). Groundwater likely to be in alluvium and in bedrock aquifers. Dewatering will be temporary and localised. Abstracted water returned to groundwater via infiltration or re-injection or to adjacent stretch of surface water body. Localised mounding of groundwater around piles may occur. CoCP and best practice for design, construction and operations reduce risks to GWDTE. Negligible impact following mitigation.	No impacts identified as result of scheme element	Localised /temporary effects	Remains Good Status	None required	Remains Good Status
4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		Cutting is shallow (3m) and in Charmouth Mudstone, designated as unproductive strata. Limited dewatering may be required. No significant impacts predicted.	No impacts identified as result of scheme element	Cutting in Charmouth Mudstone, designated as unproductive strata. Cutting crosses into Warwickshire Avon Secondary Mudrocks GWB. No significant impacts predicted.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Groundwater likely to be in alluvium and in bedrock aquifers. Dewatering will be temporary and localised. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Groundwater likely to be present in alluvium. Bedrock is mudstone. Dewatering will be temporary and localised. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Localised /temporary effects	Remains Good Status	None required	Remains Good Status
Quantitative status	Good																		

Groundwater body					Scheme Elements	Cutting				Embankment				Viaduct	Viaduct	Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Lower Boddington Cutting (CFA015)		Boddington Cutting (CFA015 / CFA016)		Edgcote Embankment North (CFA015)	Aston Le Walls Embankment (CFA015)	Highfurlong Brook Embankment	Lower Boddington Embankment (CFA015)	Edgcote Viaduct (CFA015)	Highfurlong Brook Viaduct (CFA015)				
						113-L2		113-L2		108-L2	112-L2	113-L1	114-L1	108-L1	112-L3				
GB40602G600200					Phase									Construction & Operation	Construction & Operation				
Banbury Jurassic	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate				
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)														
1. Saline or other intrusions. To identify groundwater bodies where intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	Low	Not At Risk	Good Chemical Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified	Remains Good Status	None required	Remains Good Status
2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Good	Low	Not At Risk	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Creation of new preferential pathways between alluvium and bedrock aquifers due to piling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. Changes in groundwater quality may lead to local and temporary impact on surface water quality. CoCP and best practice for design (particularly selection of piling method), construction and operations reduce risks to water quality. No significant effect on river predicted.	Creation of new preferential pathways due to piling although underlying bedrock is mudstone. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. Changes in groundwater quality may lead to local and temporary impact on surface water quality. CoCP and best practice for design (particularly selection of piling method), construction and operations reduce risks to water quality. No significant effect on river predicted.	Localised /temporary effects	Remains Good Status	None required	Remains Good Status
3. GWDTEs. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTEs.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Close to Trafford Bridge Marsh LWS. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Close to/ crosses Trafford Bridge Marsh LWS. Upper Cherwell at Trafford House SSSI is 1.4km from scheme element (upstream). Creation of new preferential pathways between alluvium and bedrock aquifers due to piling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. Changes in groundwater quality may lead to local and temporary impact on GWDTEs. CoCP and best practice for design (particularly selection of piling method), construction and operations reduce risks to GWDTEs. No significant residual impacts predicted.	No impacts identified as result of scheme element	Localised /temporary effects	Remains Good Status	None required	Remains Good Status
4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		In DrWPA but in unproductive strata. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA but in unproductive strata. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA but in unproductive strata. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA but in unproductive strata. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA but in unproductive strata. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA but in unproductive strata. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA but in unproductive strata. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. Creation of new preferential pathways between alluvium and bedrock aquifers due to piling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. /Creation of new preferential pathways, due to piling although underlying bedrock is mudstone. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Localised /temporary effects	Remains Good Status	None required	Remains Good Status
5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Localised /temporary effects	Remains Good Status	None required	Remains Good Status
Chemical status	Good																		
Overall status	Good																		

Ref:
Environment Agency (2005) The Cherwell Catchment Abstraction Management Strategy - Upper Cherwell WRMU
Environment Agency website; What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Bored Tunnel		Cutting													
						Long Itchington Bored Tunnel (CFA16)		Ladbroke Grove Cutting (CFA016)		Ladbroke Cutting (CFA016)		Southam Cutting (CFA016)		Leamington Road Cutting (CFA016)		Ufton Wood Cutting (CFA016)		Offchurch Cutting (CFA017)		Ash Beds Cutting (CFA017)		Lower Grange Cutting (CFA017)		Cubbington Cutting (CFA017 / CFA018)	
						127-L1		120-L4		122-L3		125-L1		126-L4		128-L1		130-L1		132-L2		134-L1		136-L1	
GB40902G990900					Phase	Construction	Construction & Operation	Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	
Warwickshire Avon - Secondary Mudrocks	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)																				
1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	Low	Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Good	High	Not At Risk	Good Ecological Status by 2015		Within River Itchen catchment. Bored tunnel. Limited dewatering required. No significant impacts predicted.	Tunnel annulus to be grouted. Potential localised effect on flow regime. No significant impact on surface water flows predicted.	In River Itchen catchment. Cutting in Charmouth Mudstone Formation (unproductive strata). Limited dewatering requirements predicted. No significant impacts predicted.	Cutting is in mudstone. No significant effects predicted.	Near tributaries of River Itchen. Tributary running parallel to cutting is outside RoI. Tributary at southern end of cutting is within RoI. Both streams are situated on mudstone so may not be groundwater-dependent. Cutting is predominantly in mudstone. Abstracted water returned to ground via SuDS at southern end (near stream). No significant effects on surface waters predicted.	Cutting is predominantly in mudstone. No significant effects on surface waters predicted.	Within catchment of River Itchen (GB109054044070). Abstracted water returned to ground via SuDS at northern end of cutting (end nearest river). No significant impacts predicted.	No significant impacts predicted	In catchment of River Itchen (GB109054044070). No watercourses within predicted RoI. Abstracted water to be returned to ground via SuDS. No significant impacts predicted.	In catchment of River Itchen (GB109054044070). No watercourses within predicted RoI. No significant impacts predicted.	No surface watercourses within RoI. Nearest watercourse is Grand Union Canal, which is assumed not to be GW dependent. In catchment of River Leam. Water returned to ground via SuDS. No significant impacts predicted.	No surface watercourses within RoI. Nearest watercourse is Grand Union Canal, which is assumed not to be GW dependent. Cutting predominantly in Mercia Mudstone. No significant impacts predicted.	Within catchment of River Leam (GB109054044140) and close to a tributary. Majority is aligned with catchment divide between tributaries. Not all gravel aquifers are intersected by watercourses. Abstracted water to be returned to ground using SuDS where possible. No significant impacts predicted.	Within catchment of River Leam (GB109054044140) and close to a tributary. Majority is aligned with catchment divide between tributaries. Not all gravel aquifers are intersected by watercourses. No significant impacts predicted	Close (100m) to tributary of River Leam (GB109054044140). Cutting only 0.2m deep. No significant dewatering likely to be required. No significant impacts predicted.	Cutting only 0.2m deep. No significant impacts predicted.	Within catchment of River Leam but not close to any tributaries. Abstracted water to be returned to ground using SuDS where possible. No significant impacts predicted.	Cutting completely penetrates superficial aquifer. Influence on flow regime likely to be localised. No significant impacts on surface water flows predicted.	Cutting is within catchment of River Avon (GB109050540438040 & GB109054043920). Cutting is oriented parallel to surface water divide. Abstracted water to be returned to ground using SuDS where possible. No significant impacts on surface waters predicted.	Cutting is oriented parallel to surface water divide. No significant impacts on surface waters predicted.
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs). To assess the impact of groundwater abstractions on the condition of GWDTEs.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		Scheme element crosses beneath Long Itchington & Ufton Woods SSSI and Bascote Heath Wood LWS; neither habitat is identified as GW dependent in EIA. Bored tunnel with limited dewatering required. No significant impacts predicted.	Scheme element crosses beneath Long Itchington & Ufton Woods SSSI and Bascote Heath Wood LWS; neither habitat is identified as GW dependent in EIA. Bored tunnel is at depth. No significant impacts predicted.	LWSs and River Itchin in vicinity. Cutting in Charmouth Mudstone Formation (unproductive strata). Limited dewatering requirements predicted. No significant impacts predicted.	LWSs and River Itchin in vicinity. Cutting is in mudstone. No significant effects predicted.	Crosses Windmill Hill Spinney LWS close to where there is a mapped limestone unit present; LWS not identified as GWDTE in EIA. Habitat loss due to land take has not been assessed here for GW Body status. Other LWSs in vicinity situated on mudstone but all outside predicted RoI.	Crosses Windmill Hill Spinney LWS close to where there is a mapped limestone unit present; LWS not identified as GWDTE in EIA. Habitat loss due to land take has not been assessed here for GW Body status. Other LWSs in vicinity situated on mudstone but all outside predicted RoI.	Near to River Itchen LWS. Hill Farm Wood LWS is in flood plain, downstream of scheme element, close to northern end of cutting but just outside RoI; wood is located on a different aquifer unit. Abstracted water returned to ground via SuDS at northern end of cutting (end nearest river). No significant impacts predicted.	Near to River Itchen LWS. Hill Farm Wood LWS is in flood plain, downstream of scheme element, close to northern end of cutting but just outside RoI; wood is located on a different aquifer unit. No significant impacts predicted.	LWSs within 1km of scheme element but none within predicted RoI. Abstracted water to be returned to ground via SuDS. No significant impacts predicted.	LWSs within 1km of scheme element but none within predicted RoI. No significant impacts predicted.	Long Itchington & Ufton Wood SSSI is 150m from scheme element but is not within RoI; EIA states is unlikely to be GW dependent. Other LWSs within 1km but none with RoI. Cutting predominantly in Mercia Mudstone. No significant impacts predicted.	Long Itchington & Ufton Wood SSSI is 150m from scheme element but is not within RoI; EIA states is unlikely to be GW dependent. Other LWSs within 1km but none with RoI. Cutting predominantly in Mercia Mudstone. No significant impacts predicted.	Crosses Radford Railway LWS; part of LWS is in cutting close to where stream headwaters emerge from gravel aquifer. Crosses Burnt Firs LWS; not identified in EIA as water dependent habitat. Adjacent to Ash Beds LWS; this is aligned with tributary of Leam and EIA states is likely to be surface water dependent. Habitat loss due to land take has not been assessed here for GW Body status. Abstracted water to be returned to ground using SuDS where possible. Localised impacts possible.	Crosses Radford Railway LWS; part of LWS is in cutting close to where stream headwaters emerge from gravel aquifer. Crosses Burnt Firs LWS; not identified in EIA as water dependent habitat. Adjacent to Ash Beds LWS; this is aligned with tributary of Leam and EIA states is likely to be surface water dependent. Habitat loss due to land take has not been assessed here for GW Body status. Cutting intersects gravel aquifers, dividing them. Localised impacts possible.	Close (100m) to River Leam LWS. Cutting only 0.2m deep. No significant dewatering likely to be required. No significant impacts predicted.	Cutting only 0.2m deep. No significant impacts predicted.	South Cubbington Wood Ancient Woodland is within RoI but closest part of wood is located above till. Abstracted water to be returned to ground using SuDS where possible. No significant impacts predicted.	Cutting completely penetrates superficial aquifer. Influence on flow regime likely to be localised.	South Cubbington Wood Ancient Woodland, North Cubbington Wood LWS and Weston & Waverley Woods LWS / Ancient Woodland are within 1km but not within predicted RoI of cutting. Abstracted water to be returned to ground using SuDS where possible. No significant impacts predicted.	Cutting is oriented parallel to surface water divide. No significant impacts predicted.
4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		Bored tunnel. Limited dewatering required. No significant impacts predicted.	Tunnel annulus to be grouted. Potential localised effect on flow regime. No significant impact on regional flows predicted.	Cutting in Charmouth Mudstone Formation (unproductive strata). Limited dewatering requirements predicted.	Cutting is in mudstone. No significant effects predicted.	Predominantly in Charmouth Mudstone Formation (unproductive strata). Short stretch intersects alluvium at southern end. Short central stretch intersects limestone unit within Charmouth Mudstone Formation. Deep cutting but dewatering requirements expected to be limited. Abstracted water returned to ground via SuDS at southern end	Cutting is predominantly in mudstone. Possible localised influence on flow regime in limestone unit. No significant regional effects predicted.	Majority is in Rugby Limestone Member with northern end in Saltford Shale Member. Abstracted water returned to ground via SuDS or to surface water.	Potential localised influence on flow regime. No significant influence at scale of aquifer.	Cutting intersects Penarth limestone and Langport Member limestone. Shallow groundwater in alluvium at end of cutting. Abstracted water returned to ground via SuDS.	No significant impacts on flow regime predicted.	Cutting predominantly in Mercia Mudstone. Shallow groundwater in alluvium at end of cutting. Abstracted water returned to ground via SuDS where possible.	Cutting predominantly in Mercia Mudstone. No significant impacts predicted.	Cutting intersects gravel aquifers and Mercia Mudstone Formation. Dewatering required. Abstracted water to be returned to ground using SuDS where possible. No significant impacts predicted.	Cutting intersects gravel aquifers, dividing them. Adverse impact at aquifer scale, Less significant at regional scale.	Cutting only 0.2m deep. Intersects River Terrace Gravel aquifer. No significant dewatering likely to be required. No significant impacts predicted.	Cutting only 0.2m deep. No significant impacts predicted.	Cutting intersects gravel aquifers and Mercia Mudstone Formation. Dewatering required. Abstracted water to be returned to ground using SuDS where possible. No significant impacts predicted.	Cutting completely penetrates superficial aquifer. Influence on flow regime likely to be localised.	Cutting intersects gravel aquifer at southern end. Intersects Bromsgrove Sandstone at northern end (in GWB40901G300700). Cutting may create hydraulic linkage between GW bodies. Abstracted water to be returned to ground using SuDS. Some transfer of water from WA SM GWB to WA PTS WA GWB. No significant impacts predicted.	Cutting is oriented parallel to surface water divide. Influence on flow regime expected to be localised.
Quantitative status	**Good**																								

Groundwater body					Scheme Elements	Bored Tunnel		Cutting													
						Long Itchington Bored Tunnel (CFA16)		Ladbroke Grove Cutting (CFA016)		Ladbroke Cutting (CFA016)		Southam Cutting (CFA016)		Leamington Road Cutting (CFA016)		Ufton Wood Cutting (CFA016)		Offchurch Cutting (CFA017)		Ash Beds Cutting (CFA017)		Lower Grange Cutting (CFA017)		Cubbington Cutting (CFA017 / CFA018)	
						127-L1		120-L4		122-L3		125-L1		126-L4		128-L1		130-L1		132-L2		134-L1		136-L1	
GB40902G990900					Phase	Construction	Construction & Operation	Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	
Warwickshire Avon - Secondary Mudrocks	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Disturbing or mobilising existing poor quality groundwater by depressurisation	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)																				
1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	Low	Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Good	Low	Not At Risk	Good Chemical Status by 2015		Tunnelling and shaft construction potential to have minor impact on groundwater quality due to fluids used during construction, piling and diaphragm walls. Water quality issues within groundwater likely to diminish within groundwater towards surface water receptors. Dewatering effluent will be returned to the aquifer through reinjection/recharge wells adjacent to each shaft. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Tunnel annulus to be grouted. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In River Itchin catchment. Cutting in Charmouth Mudstone Formation (unproductive strata). Limited dewatering requirements predicted. CoCP and best practice for design, construction and operations reduce risks to surface waters.	In River Itchin catchment. Cutting in Charmouth Mudstone Formation (unproductive strata). CoCP and best practice for design, construction and operations reduce risks to surface waters.	Near tributary of River Itchen. Cutting is predominantly in mudstone. Abstracted water returned to ground via SuDS at southern end (near stream). CoCP and best practice for design, construction and operations reduce risks to water quality. No significant effects on surface waters predicted.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Within catchment of River Itchen (GB109054044070). Abstracted water returned to ground via SuDS at northern end of cutting (end nearest river). CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In catchment of River Itchen (GB109054044070). No watercourses within predicted RoI. Abstracted water to be returned to ground via SuDS. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No surface watercourses within RoI. Nearest watercourse is Grand Union Canal, which is assumed not to be GW dependent. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts predicted.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Within catchment of River Leam (GB109054044140) and close to a tributary. Majority is aligned with catchment divide between tributaries. Not all gravel aquifers are intersected by watercourses. Abstracted water to be returned to ground using SuDS where possible. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element. No significant impacts predicted.	Within catchment of River Leam (GB109054044140) and close to a tributary. Majority is aligned with catchment divide between tributaries. Not all gravel aquifers are intersected by watercourses. Abstracted water to be returned to ground using SuDS where possible. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element. No significant impacts predicted.	Close (100m) to tributary of River Leam (GB109054044140). Cutting only 0.2m deep. No significant dewatering likely to be required. No significant impacts predicted.	Close (100m) to tributary of River Leam. Cutting is into gravel. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts predicted.	Within catchment of River Leam but not close to any tributaries. Abstracted water to be returned to ground using SuDS where possible. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts predicted.	Within catchment of River Leam but not close to any tributaries. Cutting is within gravels. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element
3. GWDTEs. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTEs.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		Scheme element crosses beneath Long Itchington & Ufton Woods SSSI and Bascote Heath Wood LWS; neither habitat is identified as GW dependent in EIA. Bored tunnel with limited dewatering required. No significant impacts predicted.	Tunnel annulus to be grouted. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	LWSs and River Itchin in vicinity. Cutting in Charmouth Mudstone Formation (unproductive strata). Limited dewatering requirements predicted. No significant impacts predicted.	LWSs and River Itchin in vicinity. Cutting is in mudstone. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant effects predicted.	Crosses Windmill Hill Spinney LWS close to where there is a mapped limestone unit present; LWS not identified as GWDTE in EIA. Habitat loss due to land take has not been assessed here for GW Body status. Other LWSs in vicinity situated on mudstone but all outside predicted RoI. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Crosses Windmill Hill Spinney LWS close to where there is a mapped limestone unit present; LWS not identified as GWDTE in EIA. Habitat loss due to land take has not been assessed here for GW Body status. Other LWSs in vicinity situated on mudstone but all outside predicted RoI. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Near to River Itchen LWS. Hill Farm Wood LWS is in flood plain, downstream of scheme element, close to northern end of cutting but just outside RoI; wood is located on a different aquifer unit. CoCP and best practice for design, construction and operations reduce risks to water quality. Abstracted water returned to ground via SuDS or to surface water. No significant impacts predicted.	Near to River Itchen LWS. Hill Farm Wood LWS is in flood plain, downstream of scheme element, close to northern end of cutting but just outside RoI; wood is located on a different aquifer unit. CoCP and best practice for design, construction and operations reduce risks to water quality. Abstracted water returned to ground via SuDS or to surface water. No significant impacts predicted.	LWSs within 1km of scheme element but none within predicted RoI. Abstracted water to be returned to ground via SuDS. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	LWSs within 1km of scheme element but none within predicted RoI. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Long Itchington & Ufton Wood SSSI is 150m from scheme element but is not within RoI; EIA states is unlikely to be GW dependent. Other LWSs within 1km but none with RoI. Cutting predominantly in Mercia Mudstone. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts predicted.	Long Itchington & Ufton Wood SSSI is 150m from scheme element but is not within RoI; EIA states is unlikely to be GW dependent. Other LWSs within 1km but none with RoI. Cutting predominantly in Mercia Mudstone. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts predicted.	Crosses Radford Railway LWS; part of LWS is in cutting close to where stream headwaters emerge from gravel aquifer. Crosses Burnt Firs LWS; not identified in EIA as water dependent habitat. Adjacent to Ash Beds LWS; this is aligned with tributary of Leam and EIA states is likely to be surface water dependent. Habitat loss due to land take has not been assessed here for GW Body status. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Crosses Radford Railway LWS; part of LWS is in cutting close to where stream headwaters emerge from gravel aquifer. Crosses Burnt Firs LWS; not identified in EIA as water dependent habitat. Adjacent to Ash Beds LWS; this is aligned with tributary of Leam and EIA states is likely to be surface water dependent. Habitat loss due to land take has not been assessed here for GW Body status. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Close (100m) to River Leam LWS. Cutting only 0.2m deep. No significant dewatering likely to be required. No significant impacts predicted.	Close (100m) to River Leam LWS. Cutting is into gravel. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts predicted.	South Cubbington Wood Ancient Woodland is within RoI but closest part of wood is located above till. Abstracted water to be returned to ground using SuDS where possible. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts predicted.	Cutting completely penetrates superficial aquifer. Influence on flow regime likely to be localised. No significant impacts predicted.	South Cubbington Wood Ancient Woodland, North Cubbington Wood LWS and Weston & Waverley Woods LWS / Ancient Woodland are within 1km but not within predicted RoI of cutting. Abstracted water to be returned to ground using SuDS where possible. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts predicted.	Southern part of cutting is in gravel that extends beneath LWS and AW sites but none are within predicted RoI. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element
4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		In DrWPA. Ufton Field Landfill to the southwest. Tunnelling and shaft construction potential to have minor impact on groundwater quality due to fluids used during construction, piling and diaphragm walls. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following	In DrWPA. Ufton Field Landfill to the southwest. Tunnel annulus to be grouted. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. Ufton Field Landfill to the southwest. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. Ufton Field Landfill to the southwest. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. Ufton Field Landfill to the southwest. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. Ufton Field Landfill to the southwest. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA and northern section is within SPZ3. Cutting may create hydraulic linkage between GW bodies. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA and northern section is within SPZ3. Cutting may create hydraulic linkage between GW bodies. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element
5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		Ufton Field Landfill to the southwest. Tunnelling and shaft construction potential to have minor impact on groundwater quality due to fluids used during construction, piling and diaphragm walls. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following	Ufton Field Landfill to the southwest. Tunnel annulus to be grouted. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Ufton Field Landfill to the southwest. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Ufton Field Landfill to the southwest. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Ufton Field Landfill to the southwest. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Ufton Field Landfill to the southwest. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Cutting may create hydraulic linkage between GW bodies. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Cutting may create hydraulic linkage between GW bodies. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element
Chemical status	**Good**																								
Overall status	**Good**																								

Ref:
Environment Agency (2013) Warwickshire Avon abstraction licensing strategy - River Leam catchment AP4
Environment Agency website; What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Embankment												Green Tunnel	Retaining Wall	Tunnel Portal	
						Oxford Canal Embankment (CFA016)	Upper Radbourne Embankment (CFA016)	Lower Radbourne Embankment (CFA016)	Ladbroke Grove Embankment (CFA016)	Southam Embankment (CFA016)	Mill Pond Embankment (CFA016)	Leamington Road Embankment (CFA016)	Welsh Road Embankment (CFA016 / CFA017)	Grand Union Embankment (CFA017)	Ash Beds Embankment (CFA017)	River Leam Embankment (CFA017)	Lower Grange Embankment (CFA017)	Long Itchington Wood Green Tunnel (CFA016)	Cubbington Retaining Wall (Cut) (CFA017)	Long Itchington Wood Portal (CFA016)	Ufton Wood Portal (CFA016)
						117-L1	120-L1	120-L3	121-L1	124-L1	126-L1	126-L3	129/L1	129-L3	132-L2	132-L2	133-L2	126-L5	134-L2	126-L6	128-L3
GB40902G990900					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation
Warwickshire Avon - Secondary Mudrocks	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWOTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control "Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWOTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control "Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWOTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control "Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWOTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control "Damming" of groundwater flow and reduction in groundwater contributions
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)																
1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	Low	Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element No impacts identified as result of scheme element	No impacts identified as result of scheme element No impacts identified as result of scheme element	No impacts identified as result of scheme element No impacts identified as result of scheme element	No impacts identified as result of scheme element No impacts identified as result of scheme element
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Good	High	Not At Risk	Good Ecological Status by 2015		Crosses Oxford Canal. Unlikely to be GW dependent. Close to tributary of River Itchen. CoCP and best practice for design, construction and operations reduce risks to surface waters. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Crosses tributary of River Itchen. CoCP and best practice for design, construction and operations reduce risks to surface waters. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Crosses tributary of River Leam. CoCP and best practice for design, construction and operations reduce risks to surface waters. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	In catchment of River Itchen (GB109054044070) and near minor tributary; tributary is just outside RoI. Temporary dewatering required during construction. Abstracted water returned to ground via SuDS where possible or to surface waters. Possible temporary local effects. Backfill around tunnel. Impact on flow regime likely to be localised. No significant impacts predicted.	Scheme element is within catchments of both River Avon and River Leam. No tributaries within RoI. Abstracted water to be returned to ground using SuDS both to S and N. No significant impacts predicted. Scheme element is generally within surface water catchment divide. No significant impacts predicted.	In catchment of River Itchen (GB109054044070) and near minor tributary. Temporary dewatering required during construction. No watercourses within predicted RoI. Abstracted water to be returned to ground via SuDS where possible or surface water. No significant impacts predicted. In catchment of River Itchen (GB109054044070). No watercourses within predicted RoI. No significant impacts predicted.	Temporary dewatering required during construction. No surface watercourses within RoI. Nearest watercourse is Grand Union Canal, which is assumed not to be GW dependent. Abstracted water returned to ground via SuDS where possible. No significant impacts predicted. No surface watercourses within RoI. Nearest watercourse is Grand Union Canal, which is assumed not to be GW dependent. No significant impacts predicted.
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs). To assess the impact of groundwater abstractions on the condition of GWDTEs.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		Crosses Oxford Canal LWS. Unlikely to be GW dependent. Habitat loss due to land take has not been assessed here for GW Body status. CoCP and best practice for design, construction and operations reduce risks. No significant impacts identified as result of scheme element	Adjacent to River Itchen LWS. Habitat loss due to land take has not been assessed here for GW Body status. CoCP and best practice for design, construction and operations reduce risks. No significant impacts identified as result of scheme element	Adjacent to River Itchen LWS. Habitat loss due to land take has not been assessed here for GW Body status. CoCP and best practice for design, construction and operations reduce risks. No significant impacts identified as result of scheme element	Crosses Ladbroke Fox Covert LWS. Habitat loss due to land take has not been assessed here for GW Body status. CoCP and best practice for design, construction and operations reduce risks. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Crosses Grand Union Canal LWS. Habitat loss due to land take has not been assessed here for GW Body status. CoCP and best practice for design, construction and operations reduce risks. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	Crosses River Leam LWS. Habitat loss due to land take has not been assessed here for GW Body status. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Embankment crosses Coleshill Pool Wood LWS. Close to Coleshill & Bannerly Pools SSSI: Loss of habitat beneath footprint of scheme not assessed. Mitigation through drainage design. Backfill around tunnel. Impact on flow regime likely to be localised. No significant impacts predicted.	Crosses South Cubbington Wood Ancient Woodland. Habitat loss due to land take has not been assessed here for GW Body status. North Cubbington Wood LWS is within RoI. Weston & Wawnley Woods LWS / AW and Weston Hall Marsh LWS are within 1km but not within RoI. Churchyard LWS features are outside RoI and are not considered GW dependent. Woodland on till is unlikely to be significantly influenced by changes in groundwater. Woodland on gravel may be GW dependent. Abstracted water to be returned to ground using SuDS where possible. Localised impacts may occur.. Habitat loss due to land take has not been assessed here for GW Body status. Woodland on till is unlikely to be significantly influenced by changes in groundwater. Woodland on gravel may be GW dependent. Cutting intersects gravel aquifers, dividing them. Localised impacts may occur but majority of woodland is to northeast of cutting, above the larger sections of the divided gravel aquifers.	LWSs within 1km of scheme element but none within predicted RoI. Temporary dewatering required during construction. No significant impacts predicted. LWSs within 1km of scheme element but none within predicted RoI. No significant impacts predicted.	Long Itchington & Ufton Wood SSSI is 80m from scheme element but is not within RoI; EIA states is unlikely to be GW dependent. Other LWSs within 1km but none with RoI. Portal in Mercia Mudstone and Arden Sandstone Formation. Temporary dewatering required during construction. Abstracted water returned to ground via SuDS where possible. No significant impacts predicted. Long Itchington & Ufton Wood SSSI is 150m from scheme element but is not within RoI; EIA states is unlikely to be GW dependent. Other LWSs within 1km but none with RoI. Portal in Mercia Mudstone and Arden Sandstone Formation. Localised influence on flows but no significant impacts predicted.
4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Portal intersects Langport Member limestone and Penarth Group limestone. Temporary dewatering required during construction. Abstracted water returned to ground via SuDS where possible or to surface waters. Backfill around tunnel. Impact on flow regime likely to be localised. No significant impacts predicted.	Cutting intersects gravel aquifers. Dewatering required during construction. Abstracted water to be returned to ground using SuDS at S and N ends. Some transfer of water from WA SM GWB to WA PTS WA GWB. Cutting intersects gravel aquifers, dividing them. Adverse impact at aquifer scale. Less significant at regional scale.	Portal intersects Langport Member limestone. Temporary dewatering required during construction. Abstracted water returned to ground via SuDS where possible or to surface waters. No significant impacts on flow regime predicted.	Portal in Mercia Mudstone and Arden Sandstone Formation. Temporary dewatering required during construction. Abstracted water returned to ground via SuDS where possible. Portal in Mercia Mudstone and Arden Sandstone Formation. Potential local impact on flow regime in Arden Sandstone Formation.
Quantitative status	Good																				

Groundwater body					Scheme Elements	Embankment												Green Tunnel	Retaining Wall	Tunnel Portal	
						Oxford Canal Embankment (CFA016)	Upper Radbourne Embankment (CFA016)	Lower Radbourne Embankment (CFA016)	Ladbroke Grove Embankment (CFA016)	Southam Embankment (CFA016)	Mill Pond Embankment (CFA016)	Leamington Road Embankment (CFA016)	Welsh Road Embankment (CFA016 / CFA017)	Grand Union Embankment (CFA017)	Ash Beds Embankment (CFA017)	River Leam Embankment (CFA017)	Lower Grange Embankment (CFA017)	Long Itchington Wood Green Tunnel (CFA016)	Cubbington Retaining Wall (Cut) (CFA017)	Long Itchington Wood Portal (CFA016)	Ufton Wood Portal (CFA016)
						117-L1	120-L1	120-L3	121-L1	124-L1	126-L1	126-L3	129/L1	129-L3	132-L2	132-L2	133-L2	126-L5	134-L2	126-L6	128-L3
GB40902G990900					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation
Warwickshire Avon - Secondary Mudrocks	Current status	Confidence	Risk	Status objective	Identified chemical impacts	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by depressurisation Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by depressurisation Creating or altering of pathways along which existing poor quality groundwater can migrate
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)																
1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	Low	Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element No impacts identified as result of scheme element	No impacts identified as result of scheme element No impacts identified as result of scheme element	No impacts identified as result of scheme element No impacts identified as result of scheme element	No impacts identified as result of scheme element No impacts identified as result of scheme element
2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Good	Low	Not At Risk	Good Chemical Status by 2015		Crosses Oxford Canal. Unlikely to be GW dependent. Close to tributary of River Itchen. CoCP and best practice for design, construction and operations reduce risks to surface water quality. No significant impacts identified as result of scheme element	Within floodplain of River Itchin. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Within floodplain of River Itchin. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Crosses tributary of River Itchin. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Within floodplain of River Itchin. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Within floodplain of River Itchin. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Crosses tributary of River Leam. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Within floodplain of River Leam. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Within floodplain of River Leam. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In catchment of River Itchen (GB109054044070) and near minor tributary; tributary is just outside RoI. Temporary dewatering required during construction. Abstracted water returned to ground via SuDS where possible or to surface waters. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element. Backfilling around tunnel. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Scheme element is within catchments of both River Avon and River Leam. No tributaries within RoI. Abstracted water from dewatering to be returned to ground using SuDS where possible. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In catchment of River Itchen (GB109054044070). Temporary dewatering required during construction. No watercourses within predicted RoI. Abstracted water to be returned to ground via SuDS where possible or surface water. Dewatering during construction. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Temporary dewatering required during construction. No surface watercourses within RoI. Nearest watercourse is Grand Union Canal, which is assumed not to be GW dependent. Abstracted water returned to ground via SuDS where possible. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element
3. GWDTEs. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTEs.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		Crosses Oxford Canal LWS. Unlikely to be GW dependent. Habitat loss due to land take has not been assessed here for GW Body status. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Adjacent to River Itchen LWS. Habitat loss due to land take has not been assessed here for GW Body status. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Adjacent to River Itchen LWS. Habitat loss due to land take has not been assessed here for GW Body status. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Crosses Grand Union Canal LWS. Habitat loss due to land take has not been assessed here for GW Body status. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	Crosses River Leam LWS. Habitat loss due to land take has not been assessed here for GW Body status. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Lower Farm Wood & Pool LWS is just outside RoI; aligned with tributary of River Itchen and not identified in EIA as GWDTE. Temporary dewatering required during construction. Abstracted water returned to ground via SuDS where possible or to surface waters. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element Backfilling around tunnel. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Crosses South Cubbington Wood Ancient Woodland. Habitat loss due to land take has not been assessed here for GW Body status. North Cubbington Wood LWS is within RoI. Habitat lost to the scheme has not been assessed here for GW Body status. Woodland on till is unlikely to be significantly influenced by changes in groundwater. Woodland on gravel may be GW dependent. Abstracted water from dewatering to be returned to ground using SuDS where possible. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element Habitat loss due to land take has not been assessed here for GW Body status. Woodland on till is unlikely to be significantly influenced by changes in groundwater. Woodland on gravel may be GW dependent. Cutting intersects gravel aquifers. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	LWSs within 1km of scheme element but none within predicted RoI. Temporary dewatering required during construction. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts predicted. LWSs within 1km of scheme element but none within predicted RoI. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts predicted.	Long Itchington & Ufton Wood SSSI is 80m from scheme element but is not within RoI; EIA states is unlikely to be GW dependent. Other LWSs within 1km but none with RoI. Temporary dewatering required during construction. Abstracted water returned to ground via SuDS where possible. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts predicted. Long Itchington & Ufton Wood SSSI is 150m from scheme element but is not within RoI; EIA states is unlikely to be GW dependent. Other LWSs within 1km but none with RoI. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts predicted.
4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. Ufton Field Landfill to the southwest. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. Ufton Field Landfill to the southwest. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. Ufton Field Landfill to the southwest. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element In DrWPA. Ufton Field Landfill to the southwest. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. Ufton Field Landfill to the southwest. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element In DrWPA. Ufton Field Landfill to the southwest. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element In DrWPA. Ufton Field Landfill to the southwest. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element In DrWPA. Ufton Field Landfill to the southwest. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element
5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Ufton Field Landfill to the southwest. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Ufton Field Landfill to the southwest. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Ufton Field Landfill to the southwest. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element Ufton Field Landfill to the southwest. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Ufton Field Landfill to the southwest. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element Ufton Field Landfill to the southwest. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element
Chemical status	Good																				
Overall status	Good																				

Ref:
Environment Agency (2013) Warwickshire Avon abstraction licensing strategy - River Leam catchment AP4
Environment Agency website; What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx

A. Risk screening of potential to cause deterioration of current WFD status

	Groundwater body					Scheme Elements	Viaduct					Other Key Structures				Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
							Lower Radbourne South Viaduct (CFA016)	Lower Radbourne North Viaduct (CFA016)	River Itchen Viaduct (CFA016)	Longhole Viaduct (CFA017)	River Leam Viaduct (CFA017)	A423 Banbury Road Overbridge	B4451 Kineton Road Overbridge	B4455 Fosse Way Overbridge	B4453 Rugby Road Overbridge				
							119-L1	120-L2	126-L2	129-L2	133-L1	124-S2	125-S1	131-S1	135-S2				
	GB40902G990900					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
	Warwickshire Avon - Secondary Mudrocks	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions				
WFD classification elements	**1.Saline or other intrusions.** To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	Low	Not At Risk	Good Ecological Status by 2015	Predicted change to status elements (green = none, amber = possibly, red = likely)	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impact identified.	Remains at Good Status	None required	Remains at Good Status
	2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Good	High	Not At Risk	Good Ecological Status by 2015		Temporary and localised dewatering during construction may be required. Abstracted water returned to ground or adjacent surface waters. Foundation piling may disrupt groundwater flow and cause minor obstruction to groundwater flow causing localised mounding close to the route.	Temporary and localised dewatering during construction may be required. Abstracted water returned to ground or adjacent surface waters. Foundation piling may disrupt groundwater flow and cause minor obstruction to groundwater flow causing localised mounding close to the route.	Temporary and localised dewatering during construction may be required. Abstracted water returned to ground or adjacent surface waters. Foundation piling may disrupt groundwater flow and cause minor obstruction to groundwater flow causing localised mounding close to the route.	Temporary and localised dewatering during construction may be required. Abstracted water returned to ground or adjacent surface waters. Foundation piling may disrupt groundwater flow and cause minor obstruction to groundwater flow causing localised mounding close to the route.	Temporary and localised dewatering during construction may be required. Abstracted water returned to ground or adjacent surface waters. Foundation piling may disrupt groundwater flow and cause minor obstruction to groundwater flow causing localised mounding close to the route.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Localised or temporary impacts	Remains at Good Status	None required	Remains at Good Status
	3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs). To assess the impact of groundwater abstractions on the condition of GWDTEs.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		Crosses Lower Radbourne Church Pools, identified in EIA as potential GWDTE. Habitat loss due to land take has not been assessed here for GW Body status. Temporary and localised dewatering during construction may be required. Abstracted water returned to ground or adjacent surface waters. Foundation piling may disrupt groundwater flow and cause minor obstruction to groundwater flow causing localised mounding close to the route.	Crosses River Itchen LWS. Habitat loss due to land take has not been assessed here for GW Body status. Temporary and localised dewatering during construction may be required. Abstracted water returned to ground or adjacent surface waters. Foundation piling may disrupt groundwater flow and cause minor obstruction to groundwater flow causing localised mounding close to the route.	Crosses River Itchen LWS. Habitat loss due to land take has not been assessed here for GW Body status. Hill Farm Wood LWS downstream of flood plain. Temporary and localised dewatering during construction may be required. Abstracted water returned to ground or adjacent surface waters. Foundation piling may disrupt groundwater flow and cause minor obstruction to groundwater flow causing localised mounding close to the route.	Crosses Grand Union Canal LWS. Habitat loss due to land take has not been assessed here for GW Body status. Temporary and localised dewatering during construction may be required. Abstracted water returned to ground or adjacent surface waters. Foundation piling may disrupt groundwater flow and cause minor obstruction to groundwater flow causing localised mounding close to the route.	Crosses River Leam LWS. Temporary and localised dewatering during construction may be required. Abstracted water returned to ground or adjacent surface waters. Foundation piling may disrupt groundwater flow and cause minor obstruction to groundwater flow causing localised mounding close to the route.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Localised or temporary impacts	Remains at Good Status	None required	Remains at Good Status
	4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		Temporary and localised dewatering during construction may be required. Foundation piling may disrupt groundwater flow and cause minor obstruction to groundwater flow causing localised mounding close to the route.	Temporary and localised dewatering during construction may be required. Foundation piling may disrupt groundwater flow and cause minor obstruction to groundwater flow causing localised mounding close to the route.	Temporary and localised dewatering during construction may be required. Foundation piling may disrupt groundwater flow and cause minor obstruction to groundwater flow causing localised mounding close to the route.	Temporary and localised dewatering during construction may be required. Foundation piling may disrupt groundwater flow and cause minor obstruction to groundwater flow causing localised mounding close to the route.	Temporary and localised dewatering during construction may be required. Foundation piling may disrupt groundwater flow and cause minor obstruction to groundwater flow causing localised mounding close to the route.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	Localised or temporary impacts predicted. GWB current water balance considered to have sufficient capacity to avoid change in status.	Remains at Good Status	None required	Remains at Good Status
	Quantitative status	**Good**															**Good**		**Good**

	Groundwater body					Scheme Elements	Viaduct					Other Key Structures				Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
							Lower Radbourne South Viaduct (CFA016)	Lower Radbourne North Viaduct (CFA016)	River Itchen Viaduct (CFA016)	Longhole Viaduct (CFA017)	River Leam Viaduct (CFA017)	A423 Banbury Road Overbridge	B4451 Kineton Road Overbridge	B4455 Fosse Way Overbridge	B4453 Rugby Road Overbridge				
							119-L1	120-L2	126-L2	129-L2	133-L1	124-S2	125-S1	131-S1	135-S2				
	GB40902G990900					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
	Warwickshire Avon - Secondary Mudrocks	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate				
WFD classification elements	**1.Saline or other intrusions.** To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	Low	Not At Risk	Good Ecological Status by 2015	Predicted change to status elements (green = none, amber = possibly, red = likely)	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impact identified.	Remains at Good Status	None required	Remains at Good Status
	2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Good	Low	Not At Risk	Good Chemical Status by 2015		Creation of new preferential pathways within and between shallow and bedrock aquifers due to piling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. Changes in groundwater quality may lead to impact on surface water quality. CoCP and best practice for design (particularly selection of piling method), construction and operations reduce risks to water quality.	Creation of new preferential pathways within and between shallow and bedrock aquifers due to piling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. Changes in groundwater quality may lead to impact on surface water quality. CoCP and best practice for design (particularly selection of piling method), construction and operations reduce risks to water quality.	Creation of new preferential pathways within and between shallow and bedrock aquifers due to piling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. Changes in groundwater quality may lead to impact on surface water quality. CoCP and best practice for design (particularly selection of piling method), construction and operations reduce risks to water quality.	Creation of new preferential pathways within and between shallow and bedrock aquifers due to piling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. Changes in groundwater quality may lead to impact on surface water quality. CoCP and best practice for design (particularly selection of piling method), construction and operations reduce risks to water quality.	Creation of new preferential pathways within and between shallow and bedrock aquifers due to piling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. Changes in groundwater quality may lead to impact on surface water quality. CoCP and best practice for design (particularly selection of piling method), construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In catchment of River Itchen. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Localised or temporary impacts	Remains at Good Status	None required	Remains at Good Status
	3. GWDTEs. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTEs.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		Crosses Lower Radbourne Church Pools, identified in EIA as potential GWDTE. Habitat loss due to land take has not been assessed here for GW Body status. Creation of new preferential pathways within and between shallow and bedrock aquifers due to piling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. Changes in groundwater quality may lead to impact on surface water quality. CoCP and best practice for design (particularly selection of piling method), construction and operations reduce risks to water quality.	Crosses River Itchen LWS. Habitat loss due to land take has not been assessed here for GW Body status. Creation of new preferential pathways within and between shallow and bedrock aquifers due to piling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. Changes in groundwater quality may lead to impact on surface water quality. CoCP and best practice for design (particularly selection of piling method), construction and operations reduce risks to water quality.	Crosses River Itchen LWS. Habitat loss due to land take has not been assessed here for GW Body status. Hill Farm Wood LWS downstream within flood plain. Creation of new preferential pathways within and between shallow and bedrock aquifers due to piling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. Changes in groundwater quality may lead to impact on surface water quality. CoCP and best practice for design (particularly selection of piling method), construction and operations reduce risks to water quality.	Crosses Grand Union Canal LWS. Habitat loss due to land take has not been assessed here for GW Body status. Creation of new preferential pathways within and between shallow and bedrock aquifers due to piling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. Changes in groundwater quality may lead to impact on surface water quality. CoCP and best practice for design (particularly selection of piling method), construction and operations reduce risks to water quality.	Crosses River Leam LWS. Habitat loss due to land take has not been assessed here for GW Body status. Creation of new preferential pathways within and between shallow and bedrock aquifers due to piling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. Changes in groundwater quality may lead to impact on surface water quality. CoCP and best practice for design (particularly selection of piling method), construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Localised or temporary impacts	Remains at Good Status	None required	Remains at Good Status
	4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. Hill Farm Wood LWS to the southwest. Creation of new preferential pathways within and between shallow and bedrock aquifers due to piling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. Changes in groundwater quality may lead to impact on surface water quality. CoCP and best practice for design (particularly selection of piling method), construction and operations reduce risks to water quality.	In DrWPA. Creation of new preferential pathways within and between shallow and bedrock aquifers due to piling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. Changes in groundwater quality may lead to impact on surface water quality. CoCP and best practice for design (particularly selection of piling method), construction and operations reduce risks to water quality.	In DrWPA. Creation of new preferential pathways within and between shallow and bedrock aquifers due to piling. Turbidity or fluids used in construction may influence water quality locally. Natural attenuation will reduce any turbidity resulting from construction. Changes in groundwater quality may lead to impact on surface water quality. CoCP and best practice for design (particularly selection of piling method), construction and operations reduce risks to water quality.	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Localised or temporary impacts	Remains at Good Status	None required	Remains at Good Status
	5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Ufton Field Landfill to the southwest. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Localised or temporary impacts	Remains at Good Status	None required	Remains at Good Status
	Chemical status	**Good**															**Good**		**Good**
	Overall status	**Good**															**Good**		**Good**

Ref:
Environment Agency (2013) Warwickshire Avon abstraction licensing strategy - River Leam catchment AP4
Environment Agency website; What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx

A. Risk screening of potential to cause deterioration of current WFD status

	Groundwater body					Scheme Elements	Cutting				Embankment	Other Key Structures		Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
							Cubbington Cutting (CFA18)		Stonehouse Cutting (CFA18)		Cubbington Embankment (CFA18)	Coventry Road Overbridge (CFA17)	A445 Leicester Lane Overbridge (CFA18)				
							136-L1		137-L3		137-L2	137-L1	137-S1				
	GB40901G300700					Phase	Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation				
WFD classification elements	Warwickshire Avon - PT Sandstone Warwick/Avon Confined	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control				
	1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Probably Not At Risk	Good Ecological Status by 2015	Predicted change to status: elements (green = none, amber = possibly, red = likely)	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impacts predicted.	Remains Good Status	None required	Remains Good Status
	2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Poor	Low	At Risk	Good Ecological Status by 2015		Cutting is 3m deep into Bromsgrove Sandstone. Limited dewatering may be required. ROI is estimated to be 50m. Cutting is oriented parallel to surface water divide. Water returned to ground via SuDS. No significant impacts on surface waters predicted.	Cutting is oriented parallel to surface water divide. No significant impacts on surface waters predicted.	Cutting is oriented parallel to surface water divide. Water returned to ground via SuDS; pumped to attenuation pond close to River Avon. No significant impacts on surface waters predicted.	Cutting is oriented parallel to surface water divide. No significant impacts on surface waters predicted.	No impacts identified as result of scheme element	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	Overbridge construction will require the diversion of existing road drainage. If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	Local or temporary effects. No change in status predicted.	No Significant Deterioration	None required	No Significant Deterioration
	3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs). To assess the impact of groundwater abstractions on the condition of GWDTEs.	Good	High	Not At Risk	Good Ecological Status by 2015		Cutting is 3m deep into Bromsgrove Sandstone. Limited dewatering may be required. ROI is estimated to be 50m. There are no GWDTEs found within the 50m ROI of cutting. Pond near Leicester Lane (potential GWDTE) identified 160m from cutting. No significant impacts predicted.	No impacts identified as result of scheme element	River Avon LWS is within ROI of cutting. Cutting crosses Stoneleigh Park LWS; not considered a GWDTE. Water returned to ground via SuDS; pumped to attenuation pond close to River Avon. No significant impacts on GWDTEs predicted	No impacts identified as result of scheme element	No impacts identified as result of scheme element	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	Pond near Leicester Lane (potential GWDTE) identified 160m from cutting and realigned road drainage. If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	Local or temporary effects. No change in status predicted.	Remains Good Status	None required	Remains Good Status
	4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Poor	Low	At Risk	Good Ecological Status by 2015		Cutting is 3m deep into Bromsgrove Sandstone. Limited dewatering may be required. Water returned to ground via attenuation pond within GWB; some water transferred in from WA SM GWB. CoCP and best practice for design, construction and operations reduce risks to groundwater.	No impacts identified as result of scheme element	Cutting is 5m deep and in Bromsgrove Sandstone at S end. Water returned to ground via attenuation pond next to River Avon within WA CMC GWB.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	Groundwater transferred out of GWB. GWB is already at Poor Status for water balance. GWB is small so limited capacity to absorb abstraction impacts.	No Significant Deterioration	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater to maximise potential for recharge back to groundwater. Monitoring during construction	No Significant Deterioration
	Quantitative status	Poor													Poor		Poor

	Groundwater body					Scheme Elements	Cutting				Embankment	Overbridge		Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
							Cubbington Cutting (CFA18)		Cubbington Cutting (CFA18)		Cubbington Embankment (CFA18)	Coventry Road Overbridge (CFA17)	A445 Leicester Lane Overbridge (CFA18)				
							136-L1		136-L1		137-L2	137-L1	137-S1				
	GB40901G300700					Phase	Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation				
WFD classification elements	Warwickshire Avon - PT Sandstone Warwick/Avon Confined	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	None identified	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate				
	1. Saline or other intrusions. To identify groundwater bodies where intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Probably Not At Risk	Good Chemical Status by 2015	Predicted change to status: elements (green = none, amber = possibly, red = likely)	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impacts predicted.	Remains Good Status	None required	Remains Good Status
	2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Good	Low	At Risk	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Water returned to ground via SuDS; pumped to attenuation pond close to River Avon. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Water returned to ground via SuDS; pumped to attenuation pond close to River Avon. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Overbridge construction will require the diversion of an existing road drain. This has the potential to provide preferential pathway between surface water and groundwater. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Local or temporary effects. No change in status predicted.	Remains Good Status	None required	Remains Good Status
	3. GWDTEs. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTEs.	Good	High	Not At Risk	Good Chemical Status by 2015		There are no GWDTEs found within the 50m ROI of cutting. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	There are no GWDTEs found within the 50m ROI of cutting. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Water returned to ground via SuDS; pumped to attenuation pond close to River Avon. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Water returned to ground via SuDS; pumped to attenuation pond close to River Avon. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Local or temporary effects. No change in status predicted.	Remains Good Status	None required	Remains Good Status
	4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	High	Probably At Risk	Good Chemical Status by 2015		In DrWPA and SPZ3. Minor dewatering may be required. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	In DrWPA and SPZ3. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	In DrWPA and SPZ3. Minor dewatering may be required. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	In DrWPA and SPZ3. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	In DrWPA and SPZ3. Private abstractions located to northeast. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	In DrWPA and SPZ3. There are private abstractions to the east. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Local or temporary effects. No change in status predicted.	Remains Good Status	None required	Remains Good Status
	5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	No significant impacts predicted.	Remains Good Status	None required	Remains Good Status
	Chemical status	Good													Good		Good
	Overall status	Poor													Poor		Poor

B. Risk screening of potential to prevent future attainment of good WFD status

WFD classification element currently at less than good status	**Current status**			**Status objective**	**Scheme Elements**	Cutting				Embankment	Overbridge		Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Cubbington Cutting (CFA18)		Stonehouse Cutting (CFA18)		Cubbington Embankment (CFA18)	Coventry Road Overbridge (CFA17)	A445 Leicester Lane Overbridge (CFA18)				
						136-L1		137-L3		137-L2	137-L1	137-S1				
2. Surface water (quantitative), 4. Water balance (quantitative)	Poor			Good Status by 2015	Phase	Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation				
RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	**Where RBMP measure will happen**			**When RBMP measure will happen**	**Identified chemical impacts**	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	None identified	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control				
Investigations under PR09 (AMP5) Water Industry Investment programme - Investigation to determine cost effective action to manage abstraction to support good GW quantitative status.	Severn RBD			2012		Any minor dewatering required should be considered within abstraction review assessments.	No impacts identified as result of scheme element	Any minor dewatering required should be considered within abstraction review assessments.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Any temporary dewatering required should be considered within abstraction review assessments.	Any temporary dewatering required should be considered within abstraction review assessments.	Local or temporary effects.	Local or temporary effects.	None required	Local or temporary effects.

Ref:
Environment Agency (2013) Warwickshire Avon abstraction licensing strategy - Warwickshire Avon PT Sandstone Warwick/ Avon Confined, Avon GWMU
Environment Agency website; What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx
Environment Agency (2009) River Basin Management Plan - Severn River Basin District - Annex C Actions to deliver objectives

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Cutting										Embankment							
						Glasshouse Wood Cutting (CFA18)		Kenilworth Cutting (CFA18)		Crackley Road Cutting (CFA18)		North Crackley Cutting (CFA18)		Roughknowles Wood Cutting (CFA18)		Bockenden Cutting (CFA18)		Agricultural Centre Embankment (CFA18)	Glasshouse Wood Embankment (CFA18)	Dalehouse Embankment (CFA18)	Crackley Wood Embankment (CFA18)	Broadwells Wood Embankment (CFA18)	Black Waste Wood Embankment (CFA18)	Baltall Common South Embankment (CFA18/Z3)
GB40902G302200					Phase	140-L1		141-L2		142-L2		143-L4		143-L2				139-L1	139-L3	141-L3	143-L1	144-L1	145-L2	148-L1
Warwickshire Avon - Coal Measures Coventry	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation
						Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	None identified	None identified	None identified	None identified	None identified	None identified	None identified
WFD classification elements 1. Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Probably Not At Risk	Good Ecological Status by 2015	Predicted change to status elements (green = none, amber = possibly, red = likely)	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Poor	Low	At Risk	Good Ecological Status by 2015		Cutting runs between Finham Brook and River Avon. Water returned to ground via SuDS at S end of cutting. Water transferred from Finham Brook to Avon catchment. Impact on baseflow in Finham Brook predicted to be slight. However, Finham Brook currently Moderate hydrology with flows unable to support Good ecological potential due to abstraction.	Cutting crosses surface water divide; track drainage transfers water from Finham Brook to Avon catchment. Cutting does not penetrate whole aquifer.	Cutting near Canley Brook and Finham Brook, both watercourses currently have Moderate hydrology with flows unable to support Good ecological potential due to abstraction. Finham Brook within RQ9 of cutting. Both watercourses in hydraulic continuity. Discharge pumped to attenuation pond to N near Canley Brook, upstream of cutting. No significant impacts predicted.	Cutting does not penetrate whole aquifer. No significant impacts predicted.	Cutting near (diverted) Canley Brook and a minor tributary. Watercourse is within predicted RoI of cutting. Water pumped to attenuation pond to E in old channel of Canley Brook. Possible adverse impacts on baseflow in watercourse. Flows will be retained within surface water catchment. However, Canley Brook currently Moderate hydrology with flows unable to support Good ecological potential due to abstraction.	Cutting may influence flow towards diverted Canley Brook and its tributary. However, cutting does not penetrate whole aquifer. No significant impact on watercourse predicted.	Cutting near (diverted) Canley Brook and a minor tributary. Watercourse is within predicted RoI of cutting. Water returned to ground via SuDS at E end. Localised impacts to surface water baseflow may occur.	Cutting may influence flow towards diverted Canley Brook and its tributary. However, cutting does not penetrate whole aquifer. No significant impact on watercourse predicted.	Cutting near tributary of Canley Brook. Watercourse is within predicted RoI of cutting. Embedded mitigation to reintroduce water to ground via SuDS at E end. Localised impacts to surface water baseflow may occur.	Cutting may influence flow towards tributary of Canley Brook. However, cutting does not penetrate whole aquifer. No significant impact on watercourse predicted.	Cutting near tributary of Canley Brook. Watercourse is within predicted RoI of cutting. Cutting 3m deep so dewatering requirements limited. Embedded mitigation to reintroduce water to ground via SuDS to SE.	Cutting may influence flow towards tributary of Canley Brook. However, cutting does not penetrate whole aquifer. No significant impact on watercourse predicted.	In floodplain of River Avon. No significant impacts identified as result of scheme element	In floodplain of River Avon. No significant impacts identified as result of scheme element	In floodplain of Finham Brook. No significant impacts identified as result of scheme element	Embankment crosses a tributary to the Canley Brook. No significant impacts on groundwater predicted.	Embankment crosses a tributary to the Canley Brook. No significant impacts on groundwater predicted.	Embankment crosses a tributary to the Canley Brook. No significant impacts on groundwater predicted.	Embankment crosses a tributary to the River Blythe. No significant impacts on groundwater predicted.
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs). To assess the impact of groundwater abstractions on the condition of GWDTEs.	Good	High	Not At Risk	Good Ecological Status by 2015		Cutting runs between Finham Brook and River Avon, both potential GWDTEs. Crosses Dalehouse Lane LWS. Water returned to ground via SuDS at S end of cutting. Water transferred from Finham Brook to Avon catchment.	Cutting crosses surface water divide. Cutting does not penetrate whole aquifer. Water returned to ground via SuDS at S end of cutting. Water transferred from Finham Brook to Avon catchment.	Cutting near Canley Brook and Finham Brook, both potential (undesignated) GWDTEs. Finham Brook within RQ9 of cutting and in hydraulic continuity. Discharge pumped to attenuation pond to N near Canley Brook, upstream of cutting.	Cutting does not penetrate whole aquifer. No significant impacts predicted.	Cutting near (diverted) Canley Brook, which is potential (undesignated) GWDTE. Diverted stretch may not be GWDTE. Embedded mitigation to reintroduce water to ground via SuDS where possible at or to surface water. No significant impacts predicted.	Cutting may influence flow towards diverted Canley Brook and its tributary. However, cutting does not penetrate whole aquifer. No significant impact on watercourse predicted.	Cutting near (diverted) Canley Brook, which is potential (undesignated) GWDTE. Diverted stretch may not be GWDTE. Cranley Wood North LWS / AW is outside RoI. However, cutting does not penetrate whole aquifer. No significant impact on watercourse predicted.	Cutting may influence flow towards diverted Canley Brook and its tributary. However, cutting does not penetrate whole aquifer. No significant impact on watercourse predicted.	Crosses Cranley Wood North LWS / AW, which is potential GWDTE. Close to Rough Knowles Wood AW. Loss of habitat beneath scheme footprint not assessed. Embedded mitigation to reintroduce water to ground via SuDS at E end. No significant impacts predicted.	Cutting may influence flow towards tributary of Canley Brook. However, cutting does not penetrate whole aquifer. No significant impact on watercourse predicted.	Adjacent Kenilworth to Balsall Railway Embankment LWS, which is not GWDTE. Black Waste Wood to north but is not within RQI. No impacts identified as result of scheme element	No GWDTEs within RQI. No impacts identified as result of scheme element	Embankment crosses Stoneleigh Park LWS, not considered a GWDTE. Near River Avon LWS, potential GWDTE. Loss of habitat beneath scheme element footprint not assessed. No significant impacts on groundwater identified as result of scheme element	No impacts identified as result of scheme element	Near River Avon LWS, potential GWDTE. No impacts identified as result of scheme element	Near River Sowe & Finham Brook & Lakes LWS. Finham Brook is potential GWDTE. No impacts identified as result of scheme element	Embankment crosses a tributary to the Canley Brook, potential GWDTE. Crosses Cranley Wood North Ancient Woodland / LWS / AW, potential GWDTE. Loss of habitat beneath scheme element footprint not assessed. No significant impacts on groundwater identified as result of scheme element	Embankment crosses a tributary to the Canley Brook, potential GWDTE. Embankment crosses Broadwell Wood LWS / AW, potential GWDTE. Loss of habitat beneath scheme element footprint not assessed. No significant impacts on groundwater identified as result of scheme element	Embankment crosses a tributary to the Canley Brook, potential GWDTE. Embankment built on Kenilworth to Balsall Railway Embankment LWS and crosses Black Waste Wood LWS. Loss of habitat beneath scheme element footprint not assessed. No significant impacts on groundwater identified as result of scheme element.	Embankment built on Kenilworth to Balsall Railway Embankment LWS, not considered GWDTE. Loss of habitat beneath scheme element footprint not assessed. No significant impacts on groundwater identified as result of scheme element
4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Poor	Low	Probably At Risk	Good Ecological Status by 2015		Cutting will require dewatering. Water returned to ground via SuDS at S end of cutting.	Cutting does not penetrate whole aquifer. Local influence on flow regime. No significant impacts predicted.	Cutting will require dewatering. Embedded mitigation to reintroduce water to ground via SuDS. Nearby abstractions are outside predicted RoI.	Local adverse impact on superficial aquifer.	Cutting will require dewatering. Water pumped to attenuation pond in alluvium.	Cutting does not penetrate whole aquifer. Local influence on flow regime. No significant impacts predicted.	Cutting will require dewatering. Embedded mitigation to reintroduce water to ground via SuDS.	Local influence on flow regime. No significant impacts predicted.	Cutting will require dewatering. Embedded mitigation to reintroduce water to ground via SuDS. Nearby abstractions are outside predicted RoI.	Local adverse impact on superficial aquifer.	Cutting 3m deep so dewatering requirements limited. Embedded mitigation to reintroduce water to ground via SuDS	Local influence on flow regime. No significant impacts predicted.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
Quantitative status	Poor																							

Groundwater body					Scheme Elements	Cutting										Embankment							
						Glasshouse Wood Cutting (CFA18)		Kenilworth Cutting (CFA18)		Crackley Road Cutting (CFA18)		North Crackley Cutting (CFA18)		Roughknowles Wood Cutting (CFA18)		Bockenden Cutting (CFA18)		Agricultural Centre Embankment (CFA18)	Glasshouse Wood Embankment (CFA18)	Dalehouse Embankment (CFA18)	Crackley Wood Embankment (CFA18)	Broadwells Wood Embankment (CFA18)	Black Waste Wood Embankment (CFA18)	Baltall Common South Embankment (CFA18/Z3)
GB40902G302200					Phase	140-L1		141-L2		142-L2		143-L4		143-L2				139-L1	139-L3	141-L3	143-L1	144-L1	145-L2	148-L1
Warwickshire Avon - Coal Measures Coventry	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation
						Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	None identified	None identified	None identified	None identified	None identified	None identified	None identified
WFD classification elements 1. Saline or other intrusions. To identify groundwater bodies where intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Poor	High	Probably Not At Risk	Good Chemical Status by 2015	Predicted change to status elements (green = none, amber = possibly, red = likely)	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Good	Low	At Risk	Good Chemical Status by 2015		Water returned to ground via SuDS at S end of cutting. Water transferred from Finham Brook to Avon catchment. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Water returned to ground via SuDS at S end of cutting. Water transferred from Finham Brook to Avon catchment. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Cutting adjacent to Canley Brook and Finham Brook. Finham Brook within RQ9 of cutting. Both watercourses in hydraulic continuity. Discharge pumped to attenuation pond to N near Canley Brook, upstream of cutting. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Cutting adjacent to Canley Brook and Finham Brook. Finham Brook within RQ9 of cutting. Both watercourses in hydraulic continuity. Discharge pumped to attenuation pond to N near Canley Brook, upstream of cutting. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Cutting near (diverted) Canley Brook and a minor tributary. Water pumped to attenuation pond to E in old channel of Canley Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Cutting near (diverted) Canley Brook and a minor tributary. Abstractions returned to ground via SuDS. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Cutting near tributary of Canley Brook. Abstractions returned to ground via SuDS. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Cutting near tributary of Canley Brook. Abstractions returned to ground via SuDS where possible or to surface water. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.
3. GWDTEs. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTEs.	Good	High	Not At Risk	Good Chemical Status by 2015		Cutting runs between Finham Brook and River Avon, both potential GWDTEs. GWDTE within RQ9 of cutting and in hydraulic continuity. Water returned to ground via SuDS at S end of cutting. Water transferred from Finham Brook to Avon catchment. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Cutting runs between Finham Brook and River Avon, both potential GWDTEs. River within RQ9 of cutting and in hydraulic continuity. Water returned to ground via SuDS at S end of cutting. Water transferred from Finham Brook to Avon catchment. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Cutting adjacent to Canley Brook and Finham Brook, which are potential GWDTE. Finham Brook within RQ9 of cutting. Both watercourses in hydraulic continuity. Water returned to ground via SuDS at S end of cutting. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Cutting adjacent to Canley Brook and Finham Brook within RQ9 of cutting. Both watercourses in hydraulic continuity. Discharge pumped to attenuation pond to N near Canley Brook, upstream of cutting. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Cutting near (diverted) Canley Brook, which is potential GWDTE. Water pumped to attenuation pond to E in old channel of Canley Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Cutting near (diverted) Canley Brook, which is potential GWDTE. Cranley Wood North LWS / AW is outside RoI. Embedded mitigation to reintroduce water to ground via SuDS. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Crosses Cranley Wood North LWS / AW, which is potential GWDTE. Close to Rough Knowles Wood AW. Loss of habitat beneath scheme footprint not assessed. Embedded mitigation to reintroduce water to ground via SuDS. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Adjacent Kenilworth to Balsall Railway Embankment LWS, which is not GWDTE. Black Waste Wood to north but is not within RQI. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element
4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	High	At Risk	Good Chemical Status by 2015		In DrWPA and SPZ3. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA and SPZ3. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA and SPZ3. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA and SPZ3. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA and SPZ3. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA and SPZ3. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA and SPZ3. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA and SPZ3. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA and SPZ3. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA and SPZ3. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA and partially in SPZ3. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element
5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element
Chemical status	Poor																							
Overall status	Poor																							

B. Risk screening of potential to prevent future attainment of good WFD status

WFD classification element currently at less than good status	Current status			Status objective	Scheme Elements	Cutting										Embankment							
						Glasshouse Wood Cutting (CFA18)		Kenilworth Cutting (CFA18)		Crackley Road Cutting (CFA18)		North Crackley Cutting (CFA18)		Roughknowles Wood Cutting (CFA18)		Bockenden Cutting (CFA18)		Agricultural Centre Embankment (CFA18)	Glasshouse Wood Embankment (CFA18)	Dalehouse Embankment (CFA18)	Crackley Wood Embankment (CFA18)	Broadwells Wood Embankment (CFA18)	Black Waste Wood Embankment (CFA18)	Baltall Common South Embankment (CFA18/Z3)
2. Surface water (quantitative), 4. Water balance (quantitative), 1. Saline or other intrusions (chemical)	Poor			Good Status by 2015	Phase	140-L1		141-L2		142-L2		143-L4		143-L2				139-L1	139-L3	141-L3	143-L1	144-L1	145-L2	148-L1
RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen			When RBMP measure will happen	Identified chemical impacts	Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation
						Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	None identified	None identified	None identified	None identified	None identified	None identified	None identified
Implement new regulatory approach arising from new Groundwater Directive (2006/118/EC), including Registration in conjunction with Standard Rules.	Severn RBD			2012	Predicted change to status elements (green = none, amber = possibly, red = likely)	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.
Investigations under PR09 (AMP5) Water Industry Investment programme - Investigation to determine cost effective action to manage abstraction to support good GW quantitative status.	Severn RBD			2012		Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	No significant impact	No significant impact	No significant impact	No significant impact	No significant impact	No significant impact	No significant impact
R&D on fate and transport of phosphate in groundwater to determine impact on surface water.	Severn RBD			2012		CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.
Investigations under PR09 (AMP5) Water Industry Investment programme - Investigation of drinking water source catchments to identify problems and appraise options to facilitate compliance with Article 7 of WFD at four drinking water sources in the Warwickshire Avon catchment.	Warwickshire Avon - Coal Measures Coventry			2012		CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.
Severn Trent Water catchment investigation at Brownhill Green to establish source of pollutant.	Warwickshire Avon - Coal Measures Coventry			2012		Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source
Local pollution prevention campaigns & education to include emphasis on solvent use.	Warwickshire Avon - Coal Measures Coventry			2010		CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.
Investigations under PR09 (AMP5) Water Industry Investment programme - Investigation to determine cost effective action to manage abstraction to support good ecological potential, and local measures: River Sherbourne, North Kilworth.	Warwickshire Avon - Coal Measures Coventry			2012		Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.

Ref:
Environment Agency (2013) Tame, Anker and Mease abstraction licensing strategy - Meriden GWMU
Environment Agency website; What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx
Environment Agency (2009) River Basin Management Plan - Severn River Basin District - Annex C Actions to deliver objectives

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Green Tunnel		Retaining Wall				Tunnel Portal				Viaduct			
						Burton Green Tunnel (CFA18)		Stonelegh Park Retaining Wall (Cut) (CFA18)		Canley Brook Retaining Wall (Cut) (CFA18)		Burton Green Retaining Wall (Cut) (CFA18)		Burton Green South Porous Portal (CFA18)		Burton Green North Porous Portal (CFA18)		River Avon Viaduct (CFA18)	Finham Brook Viaduct (CFA18)	Cranley Brook Viaduct (CFA18)	Balsall Common Viaduct (CFA23)
						146-L1		137-L1		142-L3		146-L2		146-L3		146-L4		139-L2	141-L1	143-L3	149-L1
GB40902G302200					Phase	Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation
Warwickshire Avon - Coal Measures Coventry	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Other Key Structures							Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						B4113 Stoneleigh Road Overbridge	B4115 Ashow Road Overbridge	A46 Kenilworth Bypass Overbridge	Coventry Leamington Rail Overbridge	A429 Kenilworth Road Overbridge	B4101 Waste Lane Overbridge	Carol Green Rail Underbridge				
GB40902G302200						138-S1	140-S1	140-S2	142-S2	142-S3	147-S4	148-S3				
					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
Warwickshire Avon - Coal Measures Coventry	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions				
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)											
1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impacts predicted	Remains at Good Status	None required	Remains at Good Status
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Poor	Low	At Risk	Good Ecological Status by 2015		If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Localised / temporary impacts predicted. However, combined impacts of all design elements have the potential to have an adverse effect on the water balance taking into account existing abstraction pressures.	No Significant Deterioration	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater to maximise potential for recharge back to groundwater. Monitoring during construction	No Significant Deterioration
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs). To assess the impact of groundwater abstractions on the condition of GWDTEs.	Good	High	Not At Risk	Good Ecological Status by 2015		If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Localised / temporary impacts	Remains at Good Status	None required	Remains at Good Status
4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Poor	Low	Probably At Risk	Good Ecological Status by 2015		If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	Localised / temporary impacts predicted. However, combined impacts of all design elements have the potential to have an adverse effect on the water balance taking into account existing abstraction pressures.	No Significant Deterioration	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater to maximise potential for recharge back to groundwater. Monitoring during construction	No Significant Deterioration
Quantitative status	Poor													Poor		Poor

Groundwater body					Scheme Elements	Other Key Structures							Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						B4113 Stoneleigh Road Overbridge	B4115 Ashow Road Overbridge	A46 Kenilworth Bypass Overbridge	Coventry Leamington Rail Overbridge	A429 Kenilworth Road Overbridge	B4101 Waste Lane Overbridge	Carol Green Rail Underbridge				
GB40902G302200						138-S1	140-S1	140-S2	142-S2	142-S3	147-S4	148-S3				
					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
Warwickshire Avon - Coal Measures Coventry	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate				
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)											
1. Saline or other intrusions: To identify groundwater bodies where intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Poor	High	Probably Not At Risk	Good Chemical Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impacts predicted	No Significant Deterioration	None required	No Significant Deterioration
2. Surface water: To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Good	Low	At Risk	Good Chemical Status by 2015		Close to River Avon - Claycoton Yelverton Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Close to River Avon. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Between River Avon and Finham Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Close to Canley Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Close to Canley Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Localised / temporary impacts	Remains at Good Status	None required	Remains at Good Status
3. GWDTEs. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTEs.	Good	High	Not At Risk	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Upstream of Berkswell Marsh. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Localised / temporary impacts	Remains at Good Status	None required	Remains at Good Status
4. Drinking Water Protected Areas (DWRPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	High	At Risk	Good Chemical Status by 2015		In DrWPA. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA and SPZ3. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA and SPZ3. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA and SPZ3. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA and SPZ3. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Localised / temporary impacts	Remains at Good Status	None required	Remains at Good Status
5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Localised / temporary impacts	Remains at Good Status	None required	Remains at Good Status
Chemical status	Poor													Poor		Poor
Overall status	Poor													Poor		Poor

B. Risk screening of potential to prevent future attainment of good WFD status

WFD classification element currently at less than good status	Current status			Status objective	Scheme Elements	Other Key Structures							Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						B4113 Stoneleigh Road Overbridge	B4115 Ashow Road Overbridge	A46 Kenilworth Bypass Overbridge	Coventry Leamington Rail Overbridge	A429 Kenilworth Road Overbridge	B4101 Waste Lane Overbridge	Carol Green Rail Underbridge				
						138-S1	140-S1	140-S2	142-S2	142-S3	147-S4	148-S3				
2. Surface water (quantitative), 4. Water balance (quantitative), 1. Saline or other intrusions (chemical)	Poor			Good Status by 2015	Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	**Where RBMP measure will happen**			**When RBMP measure will happen**	**Identified chemical impacts**	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions				
Implement new regulatory approach arising from new Groundwater Directive (2006/118/EC), including Registration in conjunction with Standard Rules.	Severn RBD			2012	Predicted change to status elements (green = none, amber = possibly, red = likely)	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	None required	RBMP Measure is insensitive to scheme element.
Investigations under PR09 (AMP5) Water Industry Investment programme - Investigation to determine cost effective action to manage abstraction to support good GW quantitative status.	Severn RBD			2012		Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	Any dewatering required should be considered within abstraction review assessments.	None required	Any dewatering required should be considered within abstraction review assessments.
R&D on fate and transport of phosphate in groundwater to determine impact on surface water.	Severn RBD			2012		CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	None required	CoCP and best practice for design, construction and operations reduce risks to water quality.
Investigations under PR09 (AMP5) Water Industry Investment programme - Investigation of drinking water source catchments to identify problems and appraise options to facilitate compliance with Article 7 of WFD at four drinking water sources in the Warwickshire Avon catchment.	Warwickshire Avon - Coal Measures Coventry			2012		CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	None required	CoCP and best practice for design, construction and operations reduce risks to water quality.
Severn Trent Water catchment investigation at Brownshill Green to establish source of pollutant.	Warwickshire Avon - Coal Measures Coventry			2012		Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	Not within SPZ for source	None required	Not within SPZ for source
Local pollution prevention campaigns & education to include emphasis on solvent use.	Warwickshire Avon - Coal Measures Coventry			2010		CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	None required	CoCP and best practice for design, construction and operations reduce risks to water quality.
Investigations under PR09 (AMP5) Water Industry Investment programme - Investigation to determine cost effective action to manage abstraction to support good ecological potential, and local measures: River Sherbourne, North Kilworth.	Warwickshire Avon - Coal Measures Coventry			2012		Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.	Not within catchment.	None required	Not within catchment.

Ref:
Environment Agency (2013) Tame, Anker and Mease abstraction licensing strategy - Meriden GWMU
Environment Agency website. What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx
Environment Agency (2009) River Basin Management Plan - Severn River Basin District - Annex C Actions to deliver objectives

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Cutting		Embankment	Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Park Lane Cutting (CFA23)		Lavender Hall Embankment (CFA23)				
GB40401G302700					Phase	149-L1		149-L2				
Tame Anker Mease - PT Sandstone Nuneaton & Meriden	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	None identified				
						Construction & Operation		Construction & Operation				
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)							
1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	Low	Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impacts identified	Remains Good Status	None required	Remains Good Status
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Good	High	Not At Risk	Good Ecological Status by 2015		Scheme element between tributaries of River Blythe (SW body GB104028042571). River Blythe is SSSI. River Blythe WRMU has restrictions on abstraction in low flow conditions (Q50 and above). Cutting is up to 12m deep and will intersect groundwater. Hydraulic connection with river via superficial and bedrock aquifers. Embedded mitigation includes use of cut-offs and reintroduction of water drained by the cutting to groundwater via SuDS. Track drainage discharged to balancing pond then Bayleys Brook. Implementation of groundwater monitoring regime during construction. No significant residual impacts post-mitigation.	Scheme element between tributaries of River Blythe (SW body GB104028042571). River Blythe is SSSI. Cutting is up to 12m deep and will intersect groundwater. Cutting oriented roughly parallel to surface water divide, limiting the potential for baseflow to be intercepted. Hydraulic connection via superficial and bedrock aquifers. Incorporate passive bypasses within the cut-off design, incorporate collars in these passive bypasses to avoid creating artificial flow paths. Track drainage discharged to balancing pond then Bayleys Brook. Implementation of monitoring regime during construction. No significant residual impacts post-mitigation.	No impacts identified as result of scheme element	Localised effects	Remains Good Status	None required	Remains Good Status
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs). To assess the impact of groundwater abstractions on the condition of GWDTEs.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		Known and potential GWDTEs in vicinity of scheme element (including Berkswell Marsh SSSI, The Bogs Ancient Woodland, Fern Bank Marsh LWS and Berkswell Hall Wood LWS). Cutting is up to 12m deep and will intersect groundwater. Hydraulic connection with GWDTEs via superficial and bedrock aquifers. Embedded mitigation includes use of cut-offs and reintroduction of water drained by the cutting to groundwater via SuDS. Track drainage discharged to balancing pond then Bayleys Brook. Implementation of groundwater monitoring regime during construction. No significant residual impacts on SSSI post-mitigation expected but requires further consideration during detailed design.	Known and potential GWDTEs in vicinity of scheme element (including Berkswell Marsh SSSI, The Bogs Ancient Woodland, Fern Bank Marsh LWS and Berkswell Hall Wood LWS). Cutting is up to 12m deep and will intersect groundwater. Hydraulic connection via superficial and bedrock aquifers. Incorporate passive bypasses within the cut-off design, incorporate collars in these passive bypasses to avoid creating artificial flow paths. Track drainage discharged to balancing pond then Bayleys Brook. Implementation of groundwater monitoring regime during construction. No significant residual impacts post-mitigation.	No impacts identified as result of scheme element	No significant residual impacts post-mitigation predicted but monitoring requred to confirm	Remains Good Status	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater to maximise potential for recharge back to groundwater. Monitoring during construction	Remains Good Status
4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		Not located within GWMU in CAMS. Nearest GWMU (Bromsgrove Sandstone Formation 200m to the north) has available capacity for abstraction. Unlicensed abstraction 200m to southwest at Silver Birch. Embedded mitigation includes reintroduction of water drained by the cutting to groundwater via SuDS, reinfiltration, trenches and balancing ponds. Track drainage discharges in TAM SC GWB so adverse impact on local water balance.	Unlicensed abstraction 200m to southwest at Silver Birch. Influence on local flow regime due to presence of cutting.	No impacts identified as result of scheme element	Groundwater being transferred out of GWB. Current water balance for GWB is at Good status but has limited spare capacity.	Remains Good Status	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater to maximise potential for recharge back to groundwater. Monitoring during construction	Remains Good Status
Quantitative status	Good									Good		Good

Groundwater body					Scheme Elements	Cutting		Embankment	Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Park Lane Cutting (CFA23)		Lavender Hall Embankment (CFA23)				
GB40401G302700					Phase	149-L3		149-L2				
Tame Anker Mease - PT Sandstone Nuneaton & Meriden	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	None identified				
						Construction & Operation		Construction & Operation				
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)							
1. Saline or other intrusions. To identify groundwater bodies where intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	Low	Not At Risk	Good Chemical Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impacts identified	Remains Good Status	None required	Remains Good Status
2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Good	Low	Not At Risk	Good Chemical Status by 2015		Scheme element between tributaries of River Blythe (SW body GB104028042571). River Blythe is SSSI. Lavender Hall landfill close (50m) to south-eastern end. Bradnocks Marsh Lane landfill 800m to the southwest. Embedded mitigation includes use of cut-offs and reintroduction of water drained by the cutting to groundwater via SuDS. Track drainage discharged to balancing pond then Bayleys Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant residual impacts identified	Scheme element between tributaries of River Blythe (SW body GB104028042571). River Blythe is SSSI. Lavender Hall landfill close (50m) to south-eastern end. Bradnocks Marsh Lane landfill 800m to the southwest. Track drainage discharged to balancing pond then Bayleys Brook. CoCP and best practice for design, construction and operations, in particular controls on pesticide usage, reduce risks to water quality. No significant residual impacts identified	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No impacts identified as result of scheme element	Localised effects	Remains Good Status	None required	Remains Good Status
3. GWDTEs. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTEs.	Good	High	Probably Not At Risk	Good Chemical Status by 2015		Known and potential GWDTEs in vicinity of scheme element (including Berkswell Marsh SSSI, The Bogs Ancient Woodland, Fern Bank Marsh LWS and Berkswell Hall Wood LWS). Lavender Hall landfill close (50m) to south-eastern end. Bradnocks Marsh Lane landfill 800m to the southwest. Embedded mitigation includes use of cut-offs and reintroduction of water drained by the cutting to groundwater via SuDS. Track drainage discharged to balancing pond then Bayleys Brook. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant residual impacts on SSSI post-mitigation expected but requires further consideration during detailed design.	Known and potential GWDTEs in vicinity of scheme element (including Berkswell Marsh SSSI, The Bogs Ancient Woodland, Fern Bank Marsh LWS and Berkswell Hall Wood LWS). Track drainage discharged to balancing pond then Bayleys Brook. CoCP and best practice for design, construction and operations, in particular controls on pesticide usage, reduce risks to groundwater quality. No significant impacts identified	Potential GWDTE (Fern Bank Marsh LWS) in vicinity of scheme element. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No impacts identified as result of scheme element	No significant residual impacts post-mitigation predicted but monitoring required to confirm	Remains Good Status	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater. Monitoring during construction	Remains Good Status
4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	Low	Probably At Risk	Good Chemical Status by 2015		In DrWPA. Lavender Hall landfill close (50m) to south-eastern end. Bradnocks Marsh Lane landfill 800m to the southwest. Unlicensed abstraction 200m to southwest at Silver Birch. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant residual impacts post-mitigation.	In DrWPA. Lavender Hall landfill close (50m) to south-eastern end. Bradnocks Marsh Lane landfill 800m to the southwest. Unlicensed abstraction 200m to southwest at Silver Birch. CoCP and best practice for design, construction and operations. No significant residual impacts post-mitigation.	In DrWPA. Lavender Hall landfill nearby. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No impacts identified as result of scheme element	Localised effects	Remains Good Status	None required	Remains Good Status
5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		Lavender Hall landfill close (50m) to south-eastern end. Bradnocks Marsh Lane landfill 800m to the southwest. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified	Lavender Hall landfill close (50m) to south-eastern end. Bradnocks Marsh Lane landfill 800m to the southwest. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified	Lavender Hall landfill nearby. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No impacts identified as result of scheme element	Localised effects	Remains Good Status	None required	Remains Good Status
Chemical status	Good									Good		Good
Overall status	Good									Good		Good

Ref:
Environment Agency (2013) Tame, Anker and Mease abstraction licensing strategy - WRMU2 - River Blythe
Environment Agency website; What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx
Environment Agency (2013) Tame, Anker and Mease abstraction licensing strategy - WRMU2 - River Blythe
Environment Agency website; What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Bored Tunnel		Cutting																									
						Bromford Tunnel (CFA025)		Hornbrook Cutting (CFA23)		Patrick Cutting (CFA23)		Diddington Cutting (CFA23/CFA24)		Bickenhill Cutting (CFA24)		Coleshill Manor Cutting (CFA19)		Gilson Cutting (CFA19)		Curdworth Cutting (CFA20)		Middleton Pool Cutting (CFA20)		Coppice Lane Cutting (CFA20)		Drayton Lane Cutting (CFA21)		Water Orton Cutting (CFA19/25)	
GB404022090800					Phase	B-168-L7		152-L4		153-L4		155-L2		156-L3		B-161-L2		163-L1		166-L2		170-L1		171-L3		173-L3		N-02-L1			
						Construction	Construction & Operation	Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation		Construction & Operation	
Tame Anker Mease - Secondary Combined	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Disturbing or mobilising existing poor quality groundwater by deepersuisation	Creating or altering of pathways along which existing poor quality groundwater can migrate	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)																										
1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	WFD classification element insensitive to impact
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Good	High	Not At Risk	Good Ecological Status by 2015		Runs parallel to River Tame. Temporary dewatering required during construction. Tunnel predominantly through mudstone. Bored tunnel so dewatering volumes predicted to be low. Abstracted water returned to surface waters.	Tunnel predominantly in mudstone. Annulus grouted. Minor local influence on groundwater flow regime through barrier effects. No significant change in surface water flow regime predicted.	Scheme element crosses tributary of River Blythe. River Blythe is SSSI. River Blythe WRMU has restrictions on abstraction in low flow conditions (Q50 and above). Hydraulic connection with river as superficial aquifers. Abstracted water discharged to attenuation pond at NW end of cutting. No significant impact on River Blythe predicted.	Scheme element could have minor local impact on groundwater flows to surface water through barrier effects. No significant change in surface water flow regime predicted.	Scheme element adjacent to River Blythe. River Blythe is SSSI. River Blythe WRMU has restrictions on abstraction in low flow conditions (Q50 and above). Hydraulic connection with river as superficial aquifers. Water discharged to River Blythe via balancing pond. Implementation of water monitoring regime during construction.	Scheme element could have minor impact on groundwater flows to surface waters through barrier effects. No significant change in surface water flow regime predicted.	Scheme element adjacent to River Blythe and between two tributaries. River Blythe is SSSI. Limited hydraulic connection via bedrock aquifer. River Blythe WRMU has restrictions on abstraction in low flow conditions (Q50 and above). Track drainage is discharged to SE to attenuation pond then Shadow Brook. Potential influence on baseflow to Hollyedl Brook to the N, which may have ecological consequences. No significant impact on River Blythe itself.	Scheme element could have minor impact on groundwater flows through barrier effects. No significant change in surface water flow regime predicted.	Scheme element crosses tributary of River Blythe. River Blythe is SSSI. River Blythe WRMU has restrictions on abstraction in low flow conditions (Q50 and above). Abstracted water returned to ground via SuDS. Localised impact on tributary possible. No significant impacts on River Blythe identified as result of scheme element.	Scheme element could have minor impact on groundwater flows through barrier effects. No significant change in surface water flow regime predicted.	Adjacent to River Cole. Hydraulic connection via superficials. Abstracted water returned to ground via SuDS where possible or to surface waters. No significant impacts identified as result of scheme element.	River Cole within ROI of cutting and is in hydraulic continuity via superficials. Scheme element could have minor localised impact on groundwater flows through barrier effects. No significant effect at river predicted.	Adjacent to tributaries of River Cole and River Tame. Hydraulic connection via superficials. Track drainage discharged to attenuation pond in River Cole catchment.	Cutting in surface water divide. Track drainage discharged to attenuation pond in River Cole catchment.	in River Tame catchment. Abstracted water returned to ground via SuDS. at upstream end. No significant impacts identified as result of scheme element.	No impacts identified as result of scheme element	Majority in catchment of Langley Brook but S end in Middleton Hall catchment. Hydraulic connection via superficials. Abstracted water returned to ground via SuDS in Middleton Hall catchment. Middleton Hall catchment currently has Moderate hydrology rating and flows cannot support Good ecological potential; thus transfer of water may be beneficial. No significant impact on baseflow in Langley Brook predicted.	No significant impacts identified as result of scheme element	Adjacent to Langley Brook. Limited hydraulic connection via bedrock aquifer. Abstracted water returned to ground via SuDS at 0 end. Possible slight influence on tributary to the N. No significant impacts identified as result of scheme element.	No significant impacts identified as result of scheme element	Cutting in low permeability strata; limited dewatering required. Abstractions returned to ground via SuDS at both ends of cutting. No significant impacts identified as result of scheme element	No significant impacts identified as result of scheme element	Near River Tame and headwaters of a tributary. Cutting is above river level. Majority of cutting above water table or in mudstone. No significant change to surface water flow regime predicted.	Cutting is above river level. Majority of cutting above water table or in mudstone. No significant change to surface water flow regime predicted.
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs). To assess the impact of groundwater abstractions on the condition of GWDTEs.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		Runs parallel to River Tame. Temporary dewatering required during construction. Tunnel predominantly through mudstone. Bored tunnel so dewatering volumes predicted to be low. Abstracted water returned to surface waters.	Tunnel predominantly in mudstone. Annulus grouted. Minor local influence on groundwater flow regime through barrier effects. No significant change in surface water flow regime predicted.	River Blythe SSSI, Berkswell Marsh SSSI, Berkswell Meadows LWS, Marsh Lane LWS, Mill Farm Quarry Pools and Mill Covert LWS within ROI of cutting and are in hydraulic continuity via superficials. Abstracted water discharged to attenuation pond at NW end of cutting.	River Blythe SSSI, Berkswell Marsh SSSI, Berkswell Meadows LWS, Marsh Lane LWS, Mill Farm Quarry Pools and Mill Covert LWS within ROI of cutting and are in hydraulic continuity via superficials. Scheme element could have minor localised impact on groundwater flows through barrier effects. No significant residual impacts on GWDTEs post-mitigation.	Patrick Farm Meadow LWS and River Blythe SSSI GWDTEs within ROI of cutting and in hydraulic continuity via superficials. Water discharged to River Blythe via balancing pond. Potential for localised effects	Patrick Farm Meadow LWS and River Blythe SSSI GWDTEs within ROI of cutting and in hydraulic continuity via superficials. Scheme element could have minor localised impact on groundwater flows through barrier effects. No significant residual impacts on GWDTEs post-mitigation.	Holywell Brook LWS and River Blythe SSSI near cutting. Limited hydraulic connection via bedrock aquifer. Track drainage is discharged to SE to attenuation pond then Shadow Brook (L Ch 155). Potential influence on baseflow to Hollwell Brook. No significant impact on River Blythe SSSI predicted.	Holywell Brook LWS and River Blythe SSSI near cutting. Limited hydraulic connection via bedrock aquifer. River Blythe SSSI is downgradient to SE to attenuation pond then Shadow Brook (L Ch 155). Adverse impact on local superficial aquifer.	Holywell Brook LWS and Denbigh Spinney LWS near to cutting. Limited hydraulic connection via bedrock aquifer. No significant effect at GWDTE predicted.	Abstractions returned to ground via SuDS. No significant impacts identified as result of scheme element	Holywell Brook LWS and Denbigh Spinney LWS near cutting. Limited hydraulic connection via bedrock aquifer. No significant effect at GWDTE predicted.	Adverse impact on flow regime as local superficial aquifer.	River Cole LWS within ROI of cutting and is in hydraulic continuity via superficials. Abstractions returned to ground via SuDS where possible or to surface waters. Negligible impact following mitigation.	River Cole LWS within ROI of cutting and is in hydraulic continuity via superficials. Scheme element could have minor localised impact on groundwater flows through barrier effects. No significant effect at river predicted.	Veteran Oak LWS nearby. Habitat loss beneath footprint of scheme not assessed. No impacts identified as result of scheme element	Veteran Oak LWS nearby. Habitat loss beneath footprint of scheme not assessed. No impacts identified as result of scheme element	Dunton Coppice LWS / AW within ROI of cutting. Abstracted water returned to ground via SuDS at upstream end of cutting. No significant impacts identified as result of scheme element.	No impacts identified as result of scheme element	Adjacent to Langley Brook LWS. Limited hydraulic connection via bedrock aquifer. Abstracted water returned to ground via SuDS. No significant impacts identified as result of scheme element.	No significant impacts identified as result of scheme element	Park Hall SINC within ROI of cutting but at lower elevation. Park Hall AW is within ROI but on steep slope. Abstractions returned to ground via SuDS where possible or to surface waters. Negligible impact following mitigation.	Park Hall SINC within ROI of cutting but at lower elevation. Park Hall AW is within ROI but on steep slope. Majority of cutting above water table or in mudstone. No significant effect at GWDTE predicted.
4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		Temporary dewatering required during construction. Tunnel predominantly through mudstone. Bored tunnel so dewatering volumes predicted to be low. Abstracted water returned to surface waters.	Tunnel predominantly in mudstone. Annulus grouted. Minor local influence on groundwater flow regime through barrier effects.	Abstractions returned to ground via SuDS where possible or to surface waters. No significant impacts identified as result of scheme element	Influence on local flow regime in superficial aquifer.	Water discharged to River Blythe via balancing pond. No significant impacts identified as result of scheme element	Influence on local flow regime in superficial aquifer.	Abstractions returned to ground via SuDS near to River Blythe. No significant impacts identified as result of scheme element	Adverse impact on local superficial aquifer.	Abstractions returned to ground via SuDS. No significant impacts identified as result of scheme element	Adverse impact on flow regime as local superficial aquifer.	Abstractions returned to ground via SuDS where possible or to surface waters. No significant impacts identified as result of scheme element	Influence on local flow regime in superficial aquifer.	Abstractions returned to ground via SuDS where possible or to surface waters. No significant impacts identified as result of scheme element	Influence on local flow regime in superficial aquifer.	Abstractions returned to ground via SuDS where possible or to surface waters. No significant impacts identified as result of scheme element	Influence on local flow regime in superficial aquifer.	Abstractions returned to ground via SuDS. No significant impacts identified as result of scheme element	Influence on local flow regime in superficial aquifer.	Abstractions returned to ground via SuDS. No significant impacts identified as result of scheme element	Influence on local flow regime in superficial aquifer.	Cutting in low permeability strata; limited dewatering required.. Abstractions returned to ground via SuDS. No significant impacts identified as result of scheme element	No significant impacts identified as result of scheme element	Majority of cutting above water table or in mudstone. Abstractions returned to ground via SuDS where possible or to surface waters. No significant impacts identified as result of scheme element	Influence on local flow regime in superficial aquifer.
Quantitative status	Good																														
5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		In or near zone of poor quality water (Tameside Drive & Freight Rover Works Landfills plus urban made ground). Abstracted water discharged to surface waters. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In or near zone of poor quality water (Tameside Drive & Freight Rover Works Landfills). Tunnel sealed. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Adjacent to landfill. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant residual impacts identified as result of scheme element	Adjacent to landfill. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant residual impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Crosses Jacksons Brickworks landfill. Poor quality groundwater known to exist locally. CoCP and best practice for design, construction and operations reduce risks to groundwater quality.	Crosses Jacksons Brickworks landfill. Poor quality groundwater known to exist locally. CoCP and best practice for design, construction and operations reduce risks to groundwater quality.	Crosses Middle Bickenhill Lane landfill. Poor quality groundwater known to exist locally. CoCP and best practice for design, construction and operations reduce risks to groundwater quality.	Crosses Middle Bickenhill Lane landfill. Poor quality groundwater known to exist locally. CoCP and best practice for design, construction and operations reduce risks to groundwater quality.	Crosses Jacksons Brickworks landfill. Poor quality groundwater known to exist locally. CoCP and best practice for design, construction and operations reduce risks to groundwater quality.	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Near to landfill and in area of poor water quality. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Near to landfill and in area of poor water quality. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Near to landfill. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Near to landfill. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Near to landfill. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Near to landfill. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element
Chemical status	Poor																														
Overall status	Poor																														

B. Risk screening of potential to prevent future attainment of good WFD status

WFD classification element currently at less than good status	Current status			Status objective	Scheme Elements	Bored Tunnel		Cutting																							
						Bromford Tunnel (CFA025)		Hornbrook Cutting (CFA23)		Patrick Cutting (CFA23)		Diddington Cutting (CFA23/CFA24)		Bickenhill Cutting (CFA24)		Coleshill Manor Cutting (CFA19)		Gilson Cutting (CFA19)		Curdworth Cutting (CFA20)		Middleton Pool Cutting (CFA20)		Coppice Lane Cutting (CFA20)		Drayton Lane Cutting (CFA21)		Water Orton Cutting (CFA19/25)	
						B-168-L7		Cutting (CFA23)		Cutting (CFA23)		Cutting (CFA23/CFA24)		Cutting (CFA24)		Coleshill Manor Cutting (CFA19)		Gilson Cutting (CFA19)		Curdworth Cutting (CFA20)		Middleton Pool Cutting (CFA20)		Coppice Lane Cutting (CFA20)		Drayton Lane Cutting (CFA21)		Water Orton Cutting (CFA19/25)	
4. Drinking Water Protected Areas (DrWPAs) (chemical)	Poor			Good Status by 2015	Phase	Construction	Construction & Operation	152-L4		153-L4		155-L2		156-L3		B-161-L2		163-L1		166-L2		170-L1		171-L3		173-L3		N-02-L1			
RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	**Where RBMP measure will happen**			**When RBMP measure will happen**	**Identified impacts**	Disturbing or mobilising existing poor quality groundwater by deepersuisation	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate
Implement new regulatory approach arising from new Groundwater Directive (2006/118/EC, including Registration in conjunction with Standard Rules.	Humber RBD			2012	**Predicted change to status elements (green = none, amber = possibly, red = likely)**	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.			RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.

Ref:
Environment Agency (2013) Tame, Anker and Mease abstraction licensing strategy - WRMU1 - Rivers Tame, Cole, Anker and Trent, WRMU2 - River Blythe and WRMU3 - Bourne/ Black Brook
Environment Agency website: What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx
Environment Agency (2009) River Basin Management Plan - Humber River Basin District - Annex C Actions to deliver objectives

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Embankment																				
						Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA24)	Embankment (CFA24)	Pool Wood Embankment (CFA24)	Coleshill Embankment No.1 (CFA19)	Coleshill Embankment No.2 (CFA19)	Coleshill Embankment No.3 (CFA19)	Coleshill Embankment No.3 (CFA19)	Coleshill Embankment No.4 (CFA19)	Gilson Embankment (CFA19)	Lichfield Road Embankment (CFA19)	Watton House Embankment (CFA19)	Embankment (CFA19)	Sewage Works Embankment (CFA19)	Faraday Avenue Embankment (CFA20)	Dunton Wood Embankment (CFA20)	Mill Pool Embankment (CFA20)	North Wood Embankment (CFA20)
						152-L1	152-L3	153-L1	153-L3	153-L5	154-L2	155-L1	156-L1	157-L1	158-L2	160-L4	160-L2	161-L4	B-161-L1	161-L2	162-L1	163-L2	164-L2	164-L6	164-L4	165-L1	167-L1	167-L4	168-L2
GB40402G990800					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation
Tame Anker Mease - Secondary Combined	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)																							
1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Good	High	Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs). To assess the impact of groundwater abstractions on the condition of GWDTEs.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		Embankment crosses Berkswell Hall Wood and Berkswell Marsh Meadow LWSs. Close to Berkswell Marsh SSSi Loss of habitat beneath footprint of scheme not assessed. Mitigation through drainage design.	No impacts identified as result of scheme element	Embankment crosses Marsh Lane Nature Reserve LWS. Loss of habitat beneath footprint of scheme not assessed. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Embankment crosses Patrick Farm Meadow LWS. Loss of habitat beneath footprint of scheme not assessed. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Embankment crosses Disused Railway & Sidings LWS and the Holywell Brook LWS. Loss of habitat beneath footprint of scheme not assessed. Mitigation through drainage design.	No impacts identified as result of scheme element	Embankment crosses Coleshill Pool Wood LWS. Close to Coleshill & Bannerly Pools SSSI. Loss of habitat beneath footprint of scheme not assessed. Mitigation through drainage design.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Embankment crosses Coleshill Hall Farm LWS. Loss of habitat beneath footprint of scheme not assessed. Mitigation through drainage design.	Embankment crosses Coleshill Hall Farm LWS. Loss of habitat beneath footprint of scheme not assessed. Mitigation through drainage design.	Adjacent to River Cole LWS. Loss of habitat beneath footprint of scheme not assessed. Mitigation through drainage design.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Close to River Tame LWS. Loss of habitat beneath footprint of scheme not assessed. Mitigation through drainage design.	Crosses Lea Marston Sludge Beds LWS. Close to River Tame LWS. Loss of habitat beneath footprint of scheme not assessed. Mitigation through drainage design.	Crosses Lea Marston Sludge Beds LWS. Close to River Tame LWS. Loss of habitat beneath footprint of scheme not assessed. Mitigation through drainage design.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Close to Cuttle Mill Pools LWS.	Embankment crosses North Wood LWS / AW. Loss of habitat beneath footprint of scheme not assessed. Mitigation through drainage design.
4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
Quantitative status	Good																										

Groundwater body					Scheme Elements	Embankment																				
						Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA24)	Embankment (CFA24)	Pool Wood Embankment (CFA24)	Coleshill Embankment No.1 (CFA19)	Coleshill Embankment No.2 (CFA19)	Coleshill Embankment No.3 (CFA19)	Coleshill Embankment No.3 (CFA19)	Coleshill Embankment No.4 (CFA19)	Gilson Embankment (CFA19)	Lichfield Road Embankment (CFA19)	Watton House Embankment (CFA19)	Embankment (CFA19)	Sewage Works Embankment (CFA19)	Faraday Avenue Embankment (CFA20)	Dunton Wood Embankment (CFA20)	Mill Pool Embankment (CFA20)	North Wood Embankment (CFA20)
						152-L1	152-L3	153-L1	153-L3	153-L5	154-L2	155-L1	156-L1	157-L1	158-L2	160-L4	160-L2	161-L4 + B-161-L1	161-L4 + B-161-L1	161-L2	162-L1	163-L2	164-L2	164-L6	164-L4	165-L1	167-L1	167-L4	168-L2
GB40402G990800					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation
Tame Anker Mease - Secondary Combined	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)																							
1. Saline or other intrusions. To identify groundwater bodies where intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Probably Not At Risk	Good Chemical Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
2. Surface water. To assess the impact of groundwater abstractions on the chemical and ecological status of surface water bodies.	Good	Low	Not At Risk	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element
3. GWDTEs. To assess the impact of nutrient concentration in groundwater (primarily phosphates) on GWDTEs.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		Embankment crosses Berkswell Hall Wood and Berkswell Marsh Meadow LWSs. Close to Berkswell Marsh SSSi Loss of habitat beneath footprint of scheme not assessed. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	Embankment crosses Marsh Lane Nature Reserve LWS. Loss of habitat beneath footprint of scheme not assessed. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Embankment crosses Patrick Farm Meadow LWS. Loss of habitat beneath footprint of scheme not assessed. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Embankment crosses Disused Railway & Sidings LWS and the Holywell Brook LWS. Loss of habitat beneath footprint of scheme not assessed. CoCP and best practice for design, construction and operations reduce risks to groundwater quality No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	Embankment crosses Coleshill Pool Wood LWS. Close to Coleshill & Bannerly Pools SSSI. Loss of habitat beneath footprint of scheme not assessed. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Embankment crosses Coleshill Hall Farm LWS. Loss of habitat beneath footprint of scheme not assessed. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Embankment crosses Coleshill Hall Farm LWS. Loss of habitat beneath footprint of scheme not assessed. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Adjacent to River Cole LWS. Loss of habitat beneath footprint of scheme not assessed. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Close to River Tame LWS. Loss of habitat beneath footprint of scheme not assessed. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Crosses Lea Marston Sludge Beds LWS. Close to River Tame LWS. Loss of habitat beneath footprint of scheme not assessed. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Crosses Lea Marston Sludge Beds LWS. Close to River Tame LWS. Loss of habitat beneath footprint of scheme not assessed. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Close to Cuttle Mill Pools LWS.	Embankment crosses North Wood LWS / AW. Loss of habitat beneath footprint of scheme not assessed. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element
4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Poor	Low	Probably At Risk	Good Chemical Status by 2015		In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Adjacent to landfill. In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Adjacent to landfill. In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Crosses Made Ground and adjacent to landfill. In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Crosses sludge beds. In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Adjacent to landfill. In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element
5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Adjacent to landfill. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Adjacent to landfill. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Crosses Made Ground and adjacent to landfill. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element
Chemical status	Poor																										
Overall status	Poor																										

B. Risk screening of potential to prevent future attainment of good WFD status

WFD classification element currently at less than good status	Current status			Status objective	Scheme Elements	Embankment																				
						Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA23)	Embankment (CFA24)	Embankment (CFA24)	Pool Wood Embankment (CFA24)	Coleshill Embankment No.1 (CFA19)	Coleshill Embankment No.2 (CFA19)	Coleshill Embankment No.3 (CFA19)	Coleshill Embankment No.3 (CFA19)	Coleshill Embankment No.4 (CFA19)	Gilson Embankment (CFA19)	Lichfield Road Embankment (CFA19)	Watton House Embankment (CFA19)	Embankment (CFA19)	Sewage Works Embankment (CFA19)	Faraday Avenue Embankment (CFA20)	Dunton Wood Embankment (CFA20)	Mill Pool Embankment (CFA20)	North Wood Embankment (CFA20)
						152-L1	152-L3	153-L1	153-L3	153-L5	154-L2	155-L1	156-L1	157-L1	158-L2	160-L4	160-L2	161-L4 + B-161-L1	161-L4 + B-161-L1	161-L2	162-L1	163-L2	164-L2	164-L6	164-L4	165-L1	167-L1	167-L4	168-L2
A. Drinking Water Protected Areas (DrWPAs) (chemical)	Poor			Good Status by 2015	Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation
RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	**Where RBMP measure will happen**			**When RBMP measure will happen**	**Identified impacts**	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate
Implement new regulatory approach arising from new Groundwater Directive (2006/118/EC), including Registration in conjunction with Standard Rules.	Humber RBD			2012	**Predicted change to status elements (green = none, amber = possibly, red = likely)**	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.

Ref:
Environment Agency (2013) Tame, Anker and Mease abstraction licensing strategy - WRMU1 - Rivers Tame, Cole, Anker and Trent, WRMU2 - River Blythe and WRMU3 - Bourne/ Black Brook
Environment Agency website. What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx
Environment Agency (2009) River Basin Management Plan - Humber River Basin District - Annex C Actions to deliver objectives

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Embankment																
						Middleton House Farm Embankment (CFA20)	Bodymoor Heath Embankment (CFA20)	Church Lane Embankment (CFA20)	Trickley Coppice Embankment (CFA20/21)	Drayton Lane Embankment (CFA20/21)	Hints Embankment (CFA21)	Green Lane Embankment (CFA19)	Attleboro Farm Embankment (CFA19)	Lanchester Way Embankment (CFA19)	Parkhall Wood Embankment (CFA025)	Embankment (CFA25)	Langley Hill Embankment (CFA025)	Unnamed Embankment (CFA26)	Marsh Lane Embankment (CFA19)	Watton Lane Embankment (CFA19)	Fulfen Farm Embankment (CFA22)	Streethay Embankment (CFA22)
						169-L2	169-L4	171-L2	172-L1	173-L2	175-L3	B-162-L1	B-163-L2	B-164-L3	B-165-L1	B-166-L1	B-166-L2	No DE_ID_NO	N-01-L2	N-00-L5	183-L5	185-L1
GB40402G990800					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation
Tame Anker Mease - Secondary Combined	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified	None identified
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)																	
1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Good	High	Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs). To assess the impact of groundwater abstractions on the condition of GWDTEs.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	Close to Langley Brook LWS. Loss of habitat beneath footprint of scheme not assessed. Mitigation through drainage design.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Embankment crosses Coleshill Park Belt LWS. Habitat loss beneath scheme footprint not assessed. No significant impacts on groundwater body identified.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Embankment crosses Park Hall SINC & AW. Habitat loss beneath scheme footprint not assessed. No significant impacts on groundwater body identified.	Embankment crosses Park Hall SINC & AW and adjacent to River Tame. Habitat loss beneath scheme footprint not assessed. No significant impacts on groundwater body identified.	Embankment crosses Park Hall SINC & AW and adjacent to River Tame. Habitat loss beneath scheme footprint not assessed. No significant impacts on groundwater body identified.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
Quantitative status	Good																					

Groundwater body					Scheme Elements	Embankment																
						Middleton House Farm Embankment (CFA20)	Bodymoor Heath Embankment (CFA20)	Church Lane Embankment (CFA20)	Trickley Coppice Embankment (CFA20/21)	Drayton Lane Embankment (CFA20/21)	Hints Embankment (CFA21)	Green Lane Embankment (CFA19)	Attleboro Farm Embankment (CFA19)	Lanchester Way Embankment (CFA19)	Parkhall Wood Embankment (CFA025)	Embankment (CFA25)	Langley Hill Embankment (CFA025)	Unnamed Embankment (CFA26)	Marsh Lane Embankment (CFA19)	Watton Lane Embankment (CFA19)	Fulfen Farm Embankment (CFA22)	Streethay Embankment (CFA22)
						169-L2	169-L4	171-L2	172-L1	173-L2	175-L3	B-162-L1	B-163-L2	B-164-L3	B-165-L1	B-166-L1	B-166-L2	No DE_ID_NO	N-01-L2	N-00-L5	183-L5	185-L1
GB40402G990800					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation
Tame Anker Mease - Secondary Combined	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)																	
1. Saline or other intrusions. To identify groundwater bodies where intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Probably Not At Risk	Good Chemical Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Good	Low	Not At Risk	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element
3. GWDTEs. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTEs.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	Close to Langley Brook LWS. Loss of habitat beneath footprint of scheme not assessed. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Embankment crosses Coleshill Park Belt LWS. Habitat loss beneath scheme footprint not assessed. No significant impacts on groundwater body identified.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Embankment crosses Park Hall SINC & AW. Habitat loss beneath scheme footprint not assessed. No significant impacts on groundwater body identified.	Embankment crosses Park Hall SINC & AW and adjacent to River Tame. Habitat loss beneath scheme footprint not assessed. No significant impacts on groundwater body identified.	Embankment crosses Park Hall SINC & AW and adjacent to River Tame. Habitat loss beneath scheme footprint not assessed. No significant impacts on groundwater body identified.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Poor	Low	Probably At Risk	Good Chemical Status by 2015		In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Adjacent to landfill. In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Adjacent to landfill. In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA and SPZ3. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element
5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Adjacent to landfill. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Adjacent to landfill. In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element
Chemical status	Poor																					
Overall status	Poor																					

B. Risk screening of potential to prevent future attainment of good WFD status

WFD classification element currently at less than good status	Current status			Status objective	Scheme Elements	Embankment																
						Middleton House Farm Embankment (CFA20)	Bodymoor Heath Embankment (CFA20)	Church Lane Embankment (CFA20)	Trickley Coppice Embankment (CFA20/21)	Drayton Lane Embankment (CFA20/21)	Hints Embankment (CFA21)	Green Lane Embankment (CFA19)	Attleboro Farm Embankment (CFA19)	Lanchester Way Embankment (CFA19)	Parkhall Wood Embankment (CFA025)	Embankment (CFA25)	Langley Hill Embankment (CFA025)	Unnamed Embankment (CFA26)	Marsh Lane Embankment (CFA19)	Watton Lane Embankment (CFA19)	Fulfen Farm Embankment (CFA22)	Streethay Embankment (CFA22)
						169-L2	169-L4	171-L2	172-L1	173-L2	175-L3	B-162-L1	B-163-L2	B-164-L3	B-165-L1	B-166-L1	B-166-L2	No DE_ID_NO	N-01-L2	N-00-L5	183-L5	185-L1
4. Drinking Water Protected Areas (DrWPAs) (chemical)	Poor			Good Status by 2015	Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation
RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	Where RBMP measure will happen			When RBMP measure will happen	Identified impacts	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate
Implement new regulatory approach arising from new Groundwater Directive (2006/118/EC), including Registration in conjunction with Standard Rules.	Humber RBD			2012	Predicted change to status elements (green = none, amber = possibly, red = likely)	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.

Ref:
Environment Agency (2013) Tame, Anker and Mease abstraction licensing strategy - WRMU1 - Rivers Tame, Cole, Anker and Trent, WRMU2 - River Blythe and WRMU3 - Bourne/ Black Brook
Environment Agency website; What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx
Environment Agency (2009) River Basin Management Plan - Humber River Basin District - Annex C Actions to deliver objectives

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Retaining Wall								Station		Tunnel Portal				Viaduct								
						Park Hall Retained Fill (CFA25)		Castle Bromwich Retained Cut (CFA025)		Washwood Heath Retained Cut (CFA026)		Saltley Retained Fill (CFA026)		156-L2		Bromford Tunnel East Portal (CFA025)		Bromford Tunnel West Portal (CFA026)		Marsh Farm Viaduct (CFA23)	River Blythe Bypass Viaduct (CFA23)	River Blythe Viaduct (CFA23)	Shadow Brook Viaduct (CFA23)	M42 Motorway Viaduct (CFA24)	M6 Motorway Viaduct No.1 (CFA24/19)	M6 Motorway Viaduct No. 2 (CFA19)	M6 Motorway Viaduct No. 3 (CFA19)	Coleshill Viaduct No. 1 (CFA19)	Coleshill Viaduct No. 1 (CFA19)
GB40402G990800					Phase	B-166-L1		B-167-L3		B-170-L4		B-172-L2		Construction & Operation		B-167-L8		B-170-L3		152-L2	153-L2	154-L3	154-L4	158-L1	160-L1	160-L3	160-L5	160-L4
Tame Anker Mease - Secondary Combined	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions

A. Risk screening of potential to cause deterioration of current WFD status

						Viaduct																			
Groundwater body					Scheme Elements	**Coleshill Viaduct No. 2 - A (CFA19)**	**Coleshill Viaduct No. 3 - A (CFA19)**	**Coleshill Viaduct No. 3 - A (CFA19)**	**Coleshill Viaduct No. 4 (CFA19)**	**Coleshill Viaduct No. 5 (CFA19)**	**Chattle Hill Viaduct (CFA19)**	**River Tame Viaduct (CFA19/20)**	**Cuttlowrth Viaduct (CFA20)**	**Birmingham & Fazeley Canal Viaduct No.1 (CFA20)**	**Birmingham & Fazeley Canal Viaduct No.2 (CFA20)**	**Cuttle Mill Viaduct (CFA20)**	**North Wood Viaduct (CFA20)**	**Hunts Green Viaduct (CFA20)**	**Langley Brook Viaduct (CFA20)**	**Drayton Basset Viaduct (CFA20/21)**	**River Cole Viaduct (CFA19)**	**M42 - M6 Motorway Link Viaduct No.1 (CFA19)**	**River Tame Viaduct (CFA0025)**	**River Tame Diversion (CFA0025)**	**Dudderston Junction Viaduct (CFA026)**	**Curzon Street No.1 Viaduct (CFA026)**	**Curzon Street No.2 Viaduct (CFA026)**	**Curzon Street No. 3 Viaduct (CFA026)**	**Water Orton Viaduct No. 1 (CFA19)**
GB404402090800						**161-L1**	**161-L3**	**161-L3**	**162-L2**	**162-L3**	**164-L1**	**164-L3**	**164-L5**	**167-L2**	**167-L5**	**168-L1**	**169-L1**	**169-L3**	**171-L1**	**173-L1**	**B-161-L4**	**B-163-L1**	**B-165-L2**	**B-166-51**	**B-173-L1**	**B-173-L2**	**B-174-L1**	**B-174-L2**	**N-00-L1**
					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation
Tame Anker Mease - Secondary Combined	**Current status**	**Confidence**	**Risk**	**Status objective**	**Identified quantitative impacts**	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTEs or groundwater abstractions by temporary 'dewatering' permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions
1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Probably Not At Risk	Good Ecological Status by 2015	Predicted change to status elements (green = none, amber = possible, red = likely)	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Good	High	Not At Risk	Good Ecological Status by 2015		Close to tributary of River Cole. Dewatering will be temporary and localised. Abstracted water returned to ground via SuDS or to adjacent stretch of surface water body. Localised mounding of groundwater around piles may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Crosses River Cole. Dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around piles may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Crosses River Cole. Dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around piles may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Close to River Cole. Dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around piles may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Crosses tributary of River Cole. Dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around piles may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Close to tributary of River Tame. Dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around piles may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Crosses

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Other Key Structures																		
						Water Orton Viaduct No. 4 (CFA19)	Water Orton Viaduct No. 3 (CFA19)	Streethay Viaduct (CFA22)	A452 Kenilworth Road Overbridge	B4102 Meriden Road Underbridge	A45 Coventry Road Overbridge	A45/M42 Jn6 Roundabout	People Mover to NEC/Airport	A452 Chester Road Highway Works	A452/A446 Roundabout Overbridges	A452 Chester Road Roundabout Highway Works	A452 Link Road Overbridge	M6 Jn4 Roundabout Highway Works	A452/B4438 Roundabout Highway Works	B4114 Birmingham Road Underbridge	Birmingham Spur Diverunder Underbridge	River Cole Diversion	B4117 Gilson Road Realignment	A446 Hams Hall Island	Leeds Spur Diverunder	A4097 Kingsbury Road Overbridge	Park Lane Diversion Highway Works	A4091 Tamworth Road Overbridge	A453 Sutton Road Overbridge
GB40402G990800						N-01-L1	N-00-L4	184-L1	153-51	153-54	155-54	156-51	156-59	156-510	157-59 & 510	157-54	157-56	157-58	158-52	161-51	162-52	162-53	163-51	165-52	166-54	166-52	170-52	170-51	174-53
					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation
Tame Anker Mease - Secondary Combined	**Current status**	**Confidence**	**Risk**	**Status objective**	**Identified quantitative impacts**	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Other Key Structures						Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						B4118 Water Orton Road Overbridge	Washwood Heath Depot	Washwood Heath Brook Diversion	River Rea Overflow Channel Realignment	B4114 Saltley Viaduct	Duddeston Mill Road Rail Bridge				
						B-165-51	B-170-53	B-170-59	B-172-53	B-173-54	B-173-54				
GB404021990800					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
Tame Anker Mease - Secondary Combined	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions				
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)										
1.Saline or other intrusions. To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impacts predicted	Remains at Good Status	None required	Remains at Good Status
2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Good	High	Not At Risk	Good Ecological Status by 2015		If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Local or temporary impacts predicted. However, combined impacts of all design elements have the potential to have an adverse effect on the WFD element.	Remains at Good Status	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater to maximise potential for recharge back to groundwater. Monitoring during construction	Remains at Good Status
3. Groundwater Dependent Terrestrial Ecosystems (GWDTEs). To assess the impact of groundwater abstractions on the condition of GWDTEs.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Local or temporary impacts predicted. However, combined impacts of all design elements have the potential to have an adverse effect on the WFD element.	Remains at Good Status	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater to maximise potential for recharge back to groundwater. Monitoring during construction	Remains at Good Status
4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	Local or temporary impacts predicted. GWB current water balance considered to have sufficient capacity to avoid change in status.	Remains at Good Status	None required	Remains at Good Status
Quantitative status	Good												Good		Good

Groundwater body					Scheme Elements	Other Key Structures						Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						B4118 Water Orton Road Overbridge	Washwood Heath Depot	Washwood Heath Brook Diversion	River Rea Overflow Channel Realignment	B4114 Saltley Viaduct	Duddeston Mill Road Rail Bridge				
						B-165-51	B-170-53	B-170-59	B-172-53	B-173-54	B-173-54				
GB404021990800					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
Tame Anker Mease - Secondary Combined	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate				
WFD classification elements					Predicted change to status elements (green = none, amber = possibly, red = likely)										
1. Saline or other intrusions. To identify groundwater bodies where intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Probably Not At Risk	Good Chemical Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No significant impacts predicted	Remains at Good Status	None required	Remains at Good Status
2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Good	Low	Not At Risk	Good Chemical Status by 2015		Close to River Tame. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Close to River Tame. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Close to River Rea. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Close to River Rea. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Local or temporary impacts predicted. However, combined impacts of all design elements have the potential to have an adverse effect on the WFD element.	Remains at Good Status	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater Monitoring during construction	Remains at Good Status
3. GWDTEs. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTEs.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Local or temporary impacts predicted. However, combined impacts of all design elements have the potential to have an adverse effect on the WFD element.	Remains at Good Status	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater. Monitoring during construction	Remains at Good Status
4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Poor	Low	Probably At Risk	Good Chemical Status by 2015		In DrWPA. Potential existing poor groundwater quality in area. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA. Potential existing poor groundwater quality in area. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA. Potential existing poor groundwater quality in area. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA. Potential existing poor groundwater quality in area. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA. Potential existing poor groundwater quality in area. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA. Potential existing poor groundwater quality in area. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Local or temporary impacts predicted. Combined impacts of all design elements have the potential to have an adverse effect on the WFD element. However, given size of GWB the deterioration is not considered significant.	No significant deterioration	Reassess once site investigation & monitoring data available Monitoring during construction	Remains at Good Status
5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		Potential existing poor groundwater quality in area. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Potential existing poor groundwater quality in area. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Potential existing poor groundwater quality in area. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Potential existing poor groundwater quality in area. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Potential existing poor groundwater quality in area. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Potential existing poor groundwater quality in area. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Local or temporary impacts predicted. Combined impacts of all design elements have the potential to have an adverse effect on the WFD element. However, given size of GWB the deterioration is not considered significant.	Remains at Good Status	Reassess once site investigation & monitoring data available Monitoring during construction	Remains at Good Status
Chemical status	Poor												Poor		Poor
Overall status	Poor												Poor		Poor

B. Risk screening of potential to prevent future attainment of good WFD status

WFD classification element currently at less than good status	Current status			Status objective	Scheme Elements	Other Key Structures						Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						B4118 Water Orton Road Overbridge	Washwood Heath Depot	Washwood Heath Brook Diversion	River Rea Overflow Channel Realignment	B4114 Saltley Viaduct	Duddeston Mill Road Rail Bridge				
						B-165-51	B-170-53	B-170-59	B-172-53	B-173-54	B-173-54				
4. Drinking Water Protected Areas (DrWPAs) (chemical)	Poor			Good Status by 2015	Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	**Where RBMP measure will happen**			**When RBMP measure will happen**	**Identified impacts**	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate				
Implement new regulatory approach arising from new Groundwater Directive (2006/118/EC), including Registration in conjunction with Standard Rules.	Humber RBD			2012	Predicted change to status elements (green = none, amber = possibly, red = likely)	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	RBMP Measure is insensitive to scheme element.	None required	RBMP Measure is insensitive to scheme element.

Ref:
Environment Agency (2013) Tame, Anker and Mease abstraction licensing strategy - WRMU1 - Rivers Tame, Cole, Anker and Trent, WRMU2 - River Blythe and WRMU3 - Bourne/ Black Brook
Environment Agency website: What's in your backyard; http://www.environment-agency.gov.uk/homeandleisure/37793.aspx
Environment Agency (2009) River Basin Management Plan - Humber River Basin District - Annex C Actions to deliver objectives

A. Risk screening of potential to cause deterioration of current WFD status

	Groundwater body					Scheme Elements	Cutting						Embankment								Station	
							Hints Cutting (CFA21)		Swinfen Hall Cutting (CFA21 and CFA22)		Whittington Common Cutting (CFA22)		Hints Embankment (CFA21)	Middich Wood Embankment (CFA21)	Bucks Head Embankment	Whittington Heath Embankment (CFA22)	Huddlesford Embankment (CFA22)	Fullen Wood South Embankment (CFA22)	Fullen Wood North Embankment (CFA22)	Curion Street Station (CFA26)	
	GB40401G301000					Phase	176-L1	Construction & Operation	177-L3	Construction & Operation	182-L1	Construction & Operation	175-L3	176-L2	177-L2	181-L1	183-L1	183-L3	183-L5	B-175-L1	Construction & Operation
	Tame Anker Mease - PT Sandstone Birmingham Lichfield	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTE's or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTE's or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTE's or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies, GWDTE's or groundwater abstractions by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions
WFD classification elements	**1.Saline or other intrusions.** To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Probably Not At Risk	Good Ecological Status by 2015	Predicted change to status elements (green = none, amber = possibly, red = likely)	No likely saline or other intrusion of poor quality water as no sources of poor water quality identified in vicinity of scheme element.	No likely saline or other intrusion of poor quality water as no sources of poor water quality identified in vicinity of scheme element.	No likely saline or other intrusion of poor quality water as no sources of poor water quality identified in vicinity of scheme element.	No likely saline or other intrusion of poor quality water as no sources of poor water quality identified in vicinity of scheme element.	No likely saline or other intrusion of poor quality water as no sources of poor water quality identified in vicinity of scheme element.	No likely saline or other intrusion of poor quality water as no sources of poor water quality identified in vicinity of scheme element.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
	2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Poor	Low	At Risk	Good Ecological Status by 2015		Black Brook / Bourne Brook located 350m east of scheme element. Although not within radius of influence, groundwater contributions to surface water are likely altered by drainage to the short but deep cutting. Contributions to baseflow in surface water body likely to be reduced in vicinity of cutting (c.1km reach). Discharge of track drainage to attenuation pond at N end, upstream of cutting, mitigating impacts.	Black Brook / Bourne Brook located 300m east of scheme element. Although not within radius of influence, groundwater contributions to surface water are likely altered by drainage to the short but deep cutting. Contributions to baseflow in surface water body likely to be reduced in vicinity of cutting (c.1km reach). Discharge of track drainage to attenuation pond at N end, upstream of cutting, mitigating impacts.	South end of cutting is in Black Bourne Brook catchment. Majority of cutting is in East Litchfield catchment (currently has Moderate hydrology with flows unable to support Good ecological potential). Minor proportion in River Tame catchment. Nearby ponds and issues likely to be impacted by local reduction in groundwater levels caused by cutting. Black Brook Corridor and Church Wood and meadow located within ROI and potential to received reduced groundwater flow as a result of drainage to cutting. GW contributions to surface watercourse to west (headwaters of East Litchfield catchment) likely to also be altered by shallow cutting. Track drainage for majority of cutting discharged into attenuation pond near S end in Black Bourne Brook catchment but close to catchment divide with East Litchfield catchment; water may be transferred out of East Litchfield catchment. Track drainage for N end of cutting discharged to N of cutting into attenuation pond near watercourse. No significant impact on River Tame catchment predicted.	Nearby ponds and issues likely to be impacted by local reduction in groundwater levels caused by cutting. Groundwater contributions to surface watercourse to west (headwaters of East Litchfield catchment) likely to also be altered by shallow cutting. Track drainage crosses catchment divide.	Possible very minor influence on groundwater contribution to nearby watercourse (East Litchfield catchment), however only likely to be minor and mitigated by reintroduction of groundwater drained by the cutting to groundwater via SuDS.	Possible very minor influence on groundwater contribution to nearby watercourse (East Litchfield catchment), however only likely to be minor and mitigated by reintroduction of groundwater drained by the cutting to groundwater via SuDS.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
	3. Groundwater Dependent Terrestrial Ecosystems (GWDTE's). To assess the impact of groundwater abstractions on the condition of GWDTE'S.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		Roundhill Wood and Rookery Wood are located within ROI on productive strata, however situated on a hill therefore unlikely to be groundwater dependent. Therefore impacts are considered negligible.	Roundhill Wood and Rookery Wood are located within ROI on productive strata, however situated on a hill therefore unlikely to be groundwater dependent. Therefore impacts are considered negligible.	Black Brook Corridor and Church Wood and meadow located within ROI and potential to received reduced groundwater flow locally as a result of drainage to cutting. Nearby ponds and issues likely to be impacted by local reduction in groundwater levels caused by cutting. No significant impact on flows in Black Brook itself predicted.	Black Brook Corridor and Church Wood and meadow located within ROI and potential to received reduced groundwater flow as a result of drainage to cutting. Nearby ponds and issues likely to be impacted by local reduction in groundwater levels caused by cutting.	Whittington Common Cutting only ecological receptor identified in vicinity of site however unlikely to be groundwater dependent and therefore no risk posed by scheme element.	Whittington Common Cutting only ecological receptor identified in vicinity of site however unlikely to be groundwater dependent and therefore no risk posed by scheme element.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
	4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Poor	Low	Probably At Risk	Good Ecological Status by 2015		Potential for dewatering to reduce groundwater levels and flow in the aquifer. Impact likely to be local and not greatly impact the regional groundwater regime. Embedded mitigation to reintroduce groundwater drained by the cutting to groundwater via SuDS	Potential for dewatering to reduce groundwater levels. Impact likely to be local and not greatly impact the regional groundwater regime. Embedded mitigation to reintroduce groundwater drained by the cutting to groundwater via SuDS.	Potential for dewatering to reduce groundwater levels. Impact likely to be local and not greatly impact the regional groundwater regime. Embedded mitigation to reintroduce groundwater drained by the cutting to groundwater via SuDS.	Potential for dewatering to reduce groundwater levels. Impact likely to be local and not greatly impact the regional groundwater regime. Embedded mitigation to reintroduce groundwater drained by the cutting to groundwater via SuDS.	Potential for dewatering to reduce groundwater levels. Impact likely to be local and not greatly impact the regional groundwater regime. Embedded mitigation to reintroduce groundwater drained by the cutting to groundwater via SuDS.	Potential for dewatering to reduce groundwater levels. Impact likely to be local and not greatly impact the regional groundwater regime. Embedded mitigation to reintroduce groundwater drained by the cutting to groundwater via SuDS.	Potential reduction in groundwater recharge due to deposition of material minimal and will be mitigated by collection of route drainage to ditches and swales for infiltration back to groundwater.	Potential reduction in groundwater recharge due to deposition of material minimal and will be mitigated by collection of route drainage to ditches and swales for infiltration back to groundwater.	Potential reduction in groundwater recharge due to deposition of material minimal and will be mitigated by collection of route drainage to ditches and swales for infiltration back to groundwater.	Potential reduction in groundwater recharge due to deposition of material minimal and will be mitigated by collection of route drainage to ditches and swales for infiltration back to groundwater.	Potential reduction in groundwater recharge due to deposition of material minimal and will be mitigated by collection of route drainage to ditches and swales for infiltration back to groundwater.	Potential reduction in groundwater recharge due to deposition of material minimal and will be mitigated by collection of route drainage to ditches and swales for infiltration back to groundwater.	Dewatering will be located and temporary. GACP and best practice for design, construction and operations reduce risks to surface water flows. Negligible impact following mitigation.	Potential reduction in groundwater recharge due to development mitigated by collection of runoff back to ground where appropriate. Potential underground works could provide barrier to groundwater flow although any impact likely to be minor and base negligible impact.

Quantitative status	Poor

	Groundwater body					Scheme Elements	Cutting						Embankment								Station	
							Hints Cutting (CFA21)		Swinfen Hall Cutting (CFA21 and CFA22)		Whittington Common Cutting (CFA22)		Hints Embankment (CFA21)	Middich Wood Embankment (CFA21)	Bucks Head Embankment	Whittington Heath Embankment (CFA22)	Huddlesford Embankment (CFA22)	Fullen Wood South Embankment (CFA22)	Fullen Wood North Embankment (CFA22)	Curion Street Station (CFA26)	
	GB40401G301000					Phase	176-L1	Construction & Operation	177-L3	Construction & Operation	182-L1	Construction & Operation	175-L3	176-L2	177-L2	181-L1	183-L1	183-L3	183-L5	B-175-L1	Construction & Operation
	Tame Anker Mease - PT Sandstone Birmingham Lichfield	Current status	Confidence	Risk	Status objective	Identified chemical impacts	Disturbing or mobilising existing poor quality groundwater by temporary/ dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary/ dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising existing poor quality groundwater by temporary/ dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	None identified	None identified		None identified	None identified	None identified	None identified	Disturbing or mobilising existing poor quality groundwater by temporary/ dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate
WFD classification elements	**1. Saline or other intrusions.** To identify groundwater bodies where intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Poor	High	Probably Not At Risk	Good Chemical Status by 2015	Predicted change to status elements (green = none, amber = possibly, red = likely)	No likely saline or other intrusion of poor quality water as no sources of poor water quality identified in vicinity of scheme element.	No likely saline or other intrusion of poor quality water as no sources of poor water quality identified in vicinity of scheme element.	No likely saline or other intrusion of poor quality water as no sources of poor water quality identified in vicinity of scheme element.	No likely saline or other intrusion of poor quality water as no sources of poor water quality identified in vicinity of scheme element.	No likely saline or other intrusion of poor quality water as no sources of poor water quality identified in vicinity of scheme element.	No likely saline or other intrusion of poor quality water as no sources of poor water quality identified in vicinity of scheme element.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
	2. Surface water. To assess the impact of groundwater on the ecological and ecological status of surface water bodies.	Good	Low	At Risk	Good Chemical Status by 2015		Black Brook / Bourne Brook located 300m east of scheme element. Discharge of track drainage to attenuation pond at N end, upstream of cutting. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Black Brook / Bourne Brook located 300m east of scheme element. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Track drainage discharged to attenuation ponds. Potential influence in baseflow to tributary of East Litchfield catchment to W of cutting. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Track drainage discharged to attenuation ponds. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element
	3. GWDTE's. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTE's.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		Roundhill Wood and Rookery Wood are located within ROI on productive strata, however situated on a hill therefore unlikely to be groundwater dependent. Discharge of track drainage to attenuation pond at N end, upstream of cutting. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Roundhill Wood and Rookery Wood are located within ROI on productive strata, however situated on a hill therefore unlikely to be groundwater dependent. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Black Brook Corridor and Church Wood and meadow located within ROI and potential to received reduced groundwater flow as a result of drainage to cutting. Track drainage discharged to attenuation ponds. Implementation of CoCP will mitigate against any pollutant link to GWDTE's during construction.	Black Brook Corridor and Church Wood and meadow located within ROI and potential to received reduced groundwater flow as a result of drainage to cutting. Track drainage discharged to attenuation ponds. Implementation of CoCP will mitigate against any pollutant link to GWDTE's during construction.	Whittington Common Cutting only ecological receptor identified in vicinity of site. However, it is unlikely to be groundwater dependent and therefore no risk posed by scheme element. Implementation of CoCP will mitigate against any pollutant link to GWDTE's during construction.	Whittington Common Cutting only ecological receptor identified in vicinity of site however unlikely to be groundwater dependent. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element
	4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	Low	At Risk	Good Chemical Status by 2015		Designated DrWPA and nearest abstraction 1.9km to the north-east and outside of the calculated radius of influence from the cutting therefore no impact identified to groundwater quality or flow at the abstraction. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Designated DrWPA and nearest abstraction 1.9km to the north-east and outside of the calculated radius of influence from the cutting therefore no impact identified to groundwater quality or flow at the abstraction. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Designated DrWPA, SP23 and nearby licensed abstractions. Potential impact to groundwater quality in SP2 through the saturated zones from scheme element during construction. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Designated DrWPA, SP23 and nearby licensed abstractions. Track drainage discharged to attenuation ponds. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Designated DrWPA and located in SP23. Likely reduction in groundwater levels minor and unlikely to have impact on SP2. Potential impact to groundwater quality in SP2 through the saturated zones from scheme element during construction. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element.	Designated DrWPA, SP23 and nearby licensed abstractions. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. Potential impact to groundwater quality through the saturated zones from scheme element during construction, including machinery fluids and disturbance leading to turbidity. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	In DrWPA. Station structure will be waterproofed. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element
	5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		Potential impact to groundwater quality through the saturated zones from scheme element during construction. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Potential impact to groundwater quality through the saturated zones from scheme element during construction. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Track drainage discharged to attenuation ponds. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Potential impact to groundwater quality through the saturated zones from scheme element during construction. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Potential impact to groundwater quality through the saturated zones from scheme element during construction, including machinery fluids and disturbance leading to turbidity. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	No impacts identified as result of scheme element

Chemical status	Poor

Overall status	Poor

B. Risk screening of potential to prevent future attainment of good WFD status

	WFD classification element currently at less than good status	Current status			Status objective	Scheme Elements	Cutting						Embankment								Station	
							Hints Cutting (CFA21)		Swinfen Hall Cutting (CFA21 and CFA22)		Whittington Common Cutting (CFA22)		Hints Embankment (CFA21)	Middich Wood Embankment (CFA21)	Bucks Head Embankment	Whittington Heath Embankment (CFA22)	Huddlesford Embankment (CFA22)	Fullen Wood South Embankment (CFA22)	Fullen Wood North Embankment (CFA22)	Curion Street Station (CFA26)	
	3. Surface water (quantitative), 4. Water balance (quantitative), 5. Saline or other intrusions (chemical)	Poor			Good Status by 2015	Phase	176-L1	Construction & Operation	177-L3	Construction & Operation	182-L1	Construction & Operation	175-L3	176-L2	177-L2	181-L1	183-L1	183-L3	183-L5	B-175-L1	Construction & Operation
	RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	**Where RBMP measure will happen**			**When RBMP measure will happen**	**Identified chemical impacts**	Disturbing or mobilising existing groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Disturbing or mobilising groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	None identified	None identified		None identified	None identified	None identified	None identified	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate
Predicted change to status elements (green = none, amber = possibly, red = likely)	Implement new regulatory approach arising from new Groundwater Directive (GWD/15/EC), including Registration in conjunction with Standard Rules.	Humber RBD			2012		RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact
	Local pollution prevention campaigns & education to include emphasis on solvent use.	Tame Anker Mease - PT Sandstone Birmingham Lichfield groundwater body			2010		CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.
	Investigation at local nature conservation site perceived to be adversely affected by abstraction: Bourne Brook and Hopwas Hayes.	Tame Anker Mease - PT Sandstone Birmingham Lichfield groundwater body			2012		Black Brook / Bourne Brook located 350m east of scheme element. Although not within radius of influence, groundwater contributions to surface water are likely to be altered by drainage to the deep cutting although relatively short in length. Contributions to baseflow in surface water body likely to be reduced in vicinity of cutting although mitigation proposed to reinject water via trenches and SuDS.	Black Brook / Bourne Brook located 300m east of scheme element. Although not within radius of influence, groundwater contributions to surface water are likely altered by drainage to the deep cutting although relatively short in length. Contributions to baseflow in surface water body likely to be reduced in vicinity of cutting although mitigation proposed to reinject water via trenches and SuDS.	Nearby ponds and issues likely to be impacted by local reduction in groundwater levels caused by cutting. Groundwater contributions to unnamed surface watercourse likely to also be altered by shallow cutting. Embedded mitigation to reintroduce groundwater drained by the cutting to groundwater via SuDS, reinfiltration, trenches and balancing ponds.	Nearby ponds and issues likely to be impacted by local reduction in groundwater levels caused by cutting. Groundwater contributions to unnamed surface watercourse likely to also be altered by shallow cutting. Embedded mitigation to reintroduce groundwater drained by the cutting to groundwater via SuDS, reinfiltration, trenches and balancing ponds.	Possible very minor influence on groundwater contribution surface waters but this is several kilometres upstream of Hopwas Hayes. No significant impact predicted.	Possible very minor influence on groundwater contribution surface waters but this is several kilometres upstream of Hopwas Hayes. No significant impact predicted.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element

Ref:

A. Risk screening of potential to cause deterioration of current WFD status

Groundwater body					Scheme Elements	Viaduct				Other Key Structures					Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Black Brook Viaduct (CFA21)	Capper's Lane Viaduct (CFA22)	Fulfen Wood Viaduct (CFA22)	Curzon Street No.3 Viaduct (CFA26)	Watling Street Overbridge	A5 Trunk Road Overbridge	A51 Tamworth Road Overbridge	A4540 Lawley Middleway	Curzon Street Station Highway Works				
GB404015301000						177-L1	183-L2	183-L4	B-174-L2	178-51	178-53	181-52	B-174-51	B-174-52				
Tame Anker Mease - PT Sandstone Birmingham Lichfield	Current status	Confidence	Risk	Status objective	Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
					Identified quantitative impacts	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions				
WFD classification elements	**1.Saline or other intrusions.** To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	High	Probably Not At Risk	Good Ecological Status by 2015	Predicted change to status elements (green = none, amber = possibly, red = likely)	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified	Remains Good Status	None required	Remains Good Status
	2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Poor	Low	At Risk	Good Ecological Status by 2015		Minor impact on groundwater flows through localised mounding of groundwater around piles. Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to surface water flows. Negligible impact following mitigation.	Minor impact on groundwater flows through localised mounding of groundwater around piles. Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to surface water flows. Negligible impact following mitigation.	No impacts identified as result of scheme element	Possibility that scheme element could have minor impact on groundwater flows through mounding of groundwater around piles however influence likely to be local and no likely impact on nearby surface waterbodies.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Predominantly localised/temporary or other minor effects. Potential adverse impact on East Litchfield Catchment, which is already unable to support Good ecological potential due to abstraction.	No Significant Deterioration	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater to maximise potential for recharge back to groundwater. Monitoring during construction	No Significant Deterioration
	3. Groundwater Dependent Terrestrial Ecosystems (GWDTE's). To assess the impact of groundwater abstractions on the condition of GWDTE'S.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		Minor impact on groundwater flows through localised mounding of groundwater around piles. Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to surface water flows. Negligible impact following mitigation.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Minor impact on groundwater flows through localised mounding of groundwater around piles. Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to surface water flows. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Embankment crosses Cotwalll Pool Wood LWS. Close to Cotesbill & Hanneely Pools SSSI. Loss of habitat beneath footprint of scheme not assessed. Mitigation through drainage design.	Remains Good Status	None required	Remains Good Status
	4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Poor	Low	Probably At Risk	Good Ecological Status by 2015		Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to surface water flows. Negligible impact following mitigation.	Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to surface water flows. Negligible impact following mitigation.	Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to surface water flows. Negligible impact following mitigation.	Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to surface water flows. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	Localised / temporary impacts predicted. However, combined impacts of all design elements have the potential to have an adverse effect on the water balance taking into account existing abstraction pressures.	No Significant Deterioration	Reassess once site investigation & monitoring data available Detailed design of discharge points for disposal of groundwater to maximise potential for recharge back to groundwater. Monitoring during construction	No Significant Deterioration
Quantitative status		Poor														Poor		Poor

Groundwater body					Scheme Elements	Viaduct				Other Key Structures					Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Black Brook Viaduct (CFA21)	Capper's Lane Viaduct (CFA22)	Fulfen Wood Viaduct (CFA22)	Curzon Street No.3 Viaduct (CFA26)	Watling Street Overbridge	A5 Trunk Road Overbridge	A51 Tamworth Road Overbridge	A4540 Lawley Middleway	Curzon Street Station Highway Works				
GB404015301000						177-L1	183-L2	183-L4	B-174-L2	178-51	178-53	181-52	B-174-51	B-174-52				
Tame Anker Mease - PT Sandstone Birmingham Lichfield	Current status	Confidence	Risk	Status objective	Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
					Identified chemical impacts	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions				
WFD classification elements	**1. Saline or other intrusions.** To identify groundwater bodies where intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Poor	High	Probably Not At Risk	Good Chemical Status by 2015	Predicted change to status elements (green = none, amber = possibly, red = likely)	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified	No Significant Deterioration	None required	No Significant Deterioration
	2. Surface water. To assess the impact of groundwater on the chemical and ecological status of surface water bodies.	Good	Low	At Risk	Good Chemical Status by 2015		Possibility that scheme element could have minor impact on groundwater quality due to piling. However influence likely to be local. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact on nearby watercourse following mitigation.	Possibility that scheme element could have minor impact on groundwater quality due to piling. However influence likely to be local. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact on nearby watercourse following mitigation.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In catchment of Black-Bourne Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In catchment of Black-Bourne Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In catchment of River Rea. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In catchment of River Rea. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Localised/temporary or other minor effect	Remains Good Status	None required	Remains Good Status
	3. GWDTE's. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTE's.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		Possibility that scheme element could have minor impact on groundwater quality due to piling. However influence likely to be local. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact on nearby potential GWDTEs following mitigation.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Possibility that scheme element could have minor impact on groundwater quality due to piling. However influence likely to be local. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact on nearby potential GWDTEs following mitigation.	In catchment of Black-Bourne Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In catchment of Black-Bourne Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Localised/temporary or other minor effect	Remains Good Status	None required	Remains Good Status
	3. Drinking Water Protected Areas. (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	Low	At Risk	Good Chemical Status by 2015		Designated DrWPA and located within SPZ3. Potential impact to groundwater quality through the saturated zones from scheme element during construction, including machinery fluids and disturbance leading to turbidity. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Designated DrWPA and located within SPZ3. Potential impact to groundwater quality through the saturated zones from scheme element during construction, including machinery fluids and disturbance leading to turbidity. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Designated DrWPA and located within SPZ3. Potential impact to groundwater quality through the saturated zones from scheme element during construction, including machinery fluids and disturbance leading to turbidity. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Potential impact to groundwater quality through the saturated zones from scheme element during construction, including machinery fluids and disturbance leading to turbidity. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	In DrWPA and SPZ1. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA and SPZ1. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA and SPZ1. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA. Potential existing poor groundwater quality in area. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	In DrWPA. Potential existing poor groundwater quality in area. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Localised/temporary or other minor effect	Remains Good Status	None required	Remains Good Status
	5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		Potential impact to groundwater quality through the saturated zones from scheme element during construction, including machinery fluids and disturbance leading to turbidity. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Potential impact to groundwater quality through the saturated zones from scheme element during construction, including machinery fluids and disturbance leading to turbidity. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Potential impact to groundwater quality through the saturated zones from scheme element during construction, including machinery fluids and disturbance leading to turbidity. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	Potential impact to groundwater quality through the saturated zones from scheme element during construction, including machinery fluids and disturbance leading to turbidity. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Potential existing poor groundwater quality in area. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Potential existing poor groundwater quality in area. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Localised/temporary or other minor effect	Remains Good Status	None required	Remains Good Status
Chemical status		Poor														Poor		Poor
Overall status		Poor														Poor		Poor

B. Risk screening of potential to prevent future attainment of good WFD status

WFD classification element currently at less than good status	Current status			Status objective	Scheme Elements	Viaduct				Other Key Structures					Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
						Black Brook Viaduct (CFA21)	Capper's Lane Viaduct (CFA22)	Fulfen Wood Viaduct (CFA22)	Curzon Street No.3 Viaduct (CFA26)	Watling Street Overbridge	A5 Trunk Road Overbridge	A51 Tamworth Road Overbridge	A4540 Lawley Middleway	Curzon Street Station Highway Works				
						177-L1	183-L2	183-L4	B-174-L2	178-51	178-53	181-52	B-174-51	B-174-52				
3. Surface water (quantitative), 4. Water balance (quantitative), 5. Saline or other intrusions (chemical)	Poor			Good Status by 2015	Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
RBMP measures to achieve objective (yet to be implemented or confirmed as implemented)	**Where RBMP measure will happen**			**When RBMP measure will happen**	**Identified chemical impacts**	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions				
Implement new regulatory approach arising from new Groundwater Directive (2006/118/EC), including Registration in conjunction with Standard Rules.	Humber RBD			2012	Predicted change to status elements (green = none, amber = possibly, red = likely)	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	RBMP measure insensitive to impact	No impacts identified	No impacts identified	None required	No impacts identified
Local pollution prevention campaign & education to include emphasis on solvent use.	Tame Anker Mease - PT Sandstone Birmingham Lichfield groundwater body			2010		CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	CoCP and best practice for design, construction and operations reduce risks to water quality.	No impacts identified	No impacts identified	None required	No impacts identified
Investigation at local nature conservation site perceived to be adversely affected by abstraction: Bourne Brook and Hopwas Hayes.	Tame Anker Mease - PT Sandstone Birmingham Lichfield groundwater body			2012		Minor impact on groundwater flows through localised mounding of groundwater around piles. Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to surface water flows. Negligible impact following mitigation.	Possible very minor influence on groundwater contribution surface waters but this is several kilometres upstream of Hopwas Hayes. No significant impact predicted.	Possible very minor influence on groundwater contribution surface waters but this is several kilometres upstream of Hopwas Hayes. No significant impact predicted.	Possible very minor influence on groundwater contribution surface waters but this is several kilometres upstream of Hopwas Hayes. No significant impact predicted.	In catchment of Black-Bourne Brook. If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	In catchment of Black-Bourne Brook. If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Localised/temporary or other minor effect	Localised/temporary or other minor effect	None required	Localised/temporary or other minor effect

Ref:

A. Risk screening of potential to cause deterioration of current WFD status

	Groundwater body					Scheme Elements	Embankment						Retaining Wall		Viaduct					Other Key Structures	Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
							Streethay Embankment (CFA 22)	Pyford Brook East Embankment (CFA22)	Pyford Brook West Embankment (CFA22)	Ravenshaw Embankment (CFA22)	Shaw Lane Embankment (CFA22)	Lilac Embankment (CFA22)	Handsacre Retaining Wall		Pyford Brook Viaduct (CFA22)	Trent & Mersey Canal East Viaduct (CFA22)	Trent & Mersey Canal West Viaduct (CFA22)	Bourne Brook Viaduct (CFA22)	Harvey's Rough Viaduct	A515 Lichfield Road Underbridge				
							185-L1	188-L4	188-L5	188-L2	190-L2	191-L2	192-L4		188-L1	188-L3	188-L6	190-L1	191-L1	190-S2				
	GB40402G300300					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
	Staffordshire Trent Valley - Mercia Mudstone East & Coal Measures	Current status	Confidence	Risk	Status objective	Identified quantitative impacts	Reduction in groundwater contributions	Reduction in groundwater contributions	Reduction in groundwater contributions	Reduction in groundwater contributions	Reduction in groundwater contributions	Reduction in groundwater contributions	Lowering of groundwater levels and reduction in groundwater contributions to surface water bodies or GWDTE's by temporary dewatering/ permanent groundwater control	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions	"Damming" of groundwater flow and reduction in groundwater contributions				
WFD classification elements	**1.Saline or other intrusions.** To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015	Predicted change to status elements (green = none, amber = possibly, red = likely)	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified	Remains Good Status	None required	Remains Good Status
	2. Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.	Good	Low	Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Near tributaries of River Trent and Longdon/Armitage Catchment. Trent & Mersey canal not considered GW dependent. Abstracted water returned to ground via SuDS where possible or to surface water. Localised effects on baseflows.	In GW divide between tributaries. Cut-off wall likely to affect flows in superficials. Adjacent to existing cutting. No significant impacts predicted.	Groundwater in hydraulic connection with Pyford Brook. Minor impact on groundwater flows through localised mounding of groundwater around piles. Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to surface water flows. Negligible impact following mitigation.	Canal unlikely to be in hydraulic connection with groundwater but site also near Pyford Brook. Minor impact on groundwater flows through localised mounding of groundwater around piles. Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to surface water flows. Negligible impact following mitigation.	Canal unlikely to be in hydraulic connection with groundwater but site also near Pyford Brook. Minor impact on groundwater flows through localised mounding of groundwater around piles. Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to surface water flows. Negligible impact following mitigation.	Groundwater in hydraulic connection with Bourne Brook. Minor impact on groundwater flows through localised mounding of groundwater around piles. Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to surface water flows. Negligible impact following mitigation.	Minor impact on groundwater flows through localised mounding of groundwater around piles. Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to surface water flows. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Localised/temporary or other minor effect	Remains Good Status	None required	Remains Good Status
	3. Groundwater Dependent Terrestrial Ecosystems (GWDTE's). To assess the impact of groundwater abstractions on the condition of GWDTE's.	Good	Low	Probably Not At Risk	Good Ecological Status by 2015		Route crosses undesignated woodland with drains and a pool (southwest of East Hill Business Park, Fradley). Pool likely to be lost to the scheme so impact on groundwater body status not assessed. Potential GWDTEs identified. No impacts to groundwater body status identified as result of scheme element	Route crosses Fradley Wood, Curborough Brook and associated habitats. Potential GWDTEs identified. No impacts to groundwater body status identified as result of scheme element	Route crosses Fradley Wood, Curborough Brook and associated habitats. Potential GWDTEs identified. No impacts to groundwater body status identified as result of scheme element	Route close to pond at Black Slough Wood and ponds at Wood End Lane. Ponds likely to be lost to the scheme so impact on groundwater body status not assessed. Route crosses Ravenshaw Wood, Black Slough and Slash, Tomhay Wood, Vicar's Coppice. Potential GWDTEs identified. No impacts to groundwater body status identified as result of scheme element	John's Gorse Ancient Woodland and BAP habitat including ponds and wet woodlands crossed by route. Potential GWDTEs identified. No impacts to groundwater body status identified as result of scheme element	Near LWS wetland area off Tuppenhurst Lane. Potential GWDTEs identified. No impacts to groundwater body status identified as result of scheme element	Near LWS wetland area off Tuppenhurst Lane. Potential GWDTEs identified. No impacts to groundwater body status identified as result of scheme element	Cut-off walls will locally influence flow regime in superficials. Adjacent to existing cutting.	Close to Fradley Wood, Curborough Brook and associated habitats. Potential GWDTEs identified in vicinity. Minor impact on groundwater flows through localised mounding of groundwater around piles. Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to GWDTEs. Negligible impact following mitigation.	Route crosses Fradley Wood, Curborough Brook and associated habitats. Canal habitats not considered groundwater dependent. Potential GWDTEs in vicinity. Minor impact on groundwater flows through localised mounding of groundwater around piles. Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to GWDTEs. Negligible impact following mitigation.	Route crosses Fradley Wood, Curborough Brook and associated habitats. Canal habitats not considered groundwater dependent. Potential GWDTEs identified in vicinity. Minor impact on groundwater flows through localised mounding of groundwater around piles. Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to GWDTEs. Negligible impact following mitigation.	Close to John's Gorse Ancient Woodland and BAP Habitat, including ponds and wet woodland habitat. Vicar's Coppice Ancient Woodland nearby. Ponds that will be lost within construction footprint have not been assessed with respect to groundwater body status. Minor impact on groundwater flows through localised mounding of groundwater around piles. Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to GWDTEs. Negligible impact following mitigation.	Route close to pond near Shaw House. Pond likely to be lost to the scheme so impact on groundwater body status not assessed. Ancient Woodland nearby. Minor impact on groundwater flows through localised mounding of groundwater around piles. Dewatering will be localised and temporary. CoCP and best practice for design, construction and operations reduce risks to GWDTEs. Negligible impact following mitigation.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water. Localised mounding of groundwater around foundations may occur. CoCP and best practice for design, construction and operations reduce risks. Negligible impact following mitigation.	Localised/temporary or other minor effect	Remains Good Status	None required	Remains Good Status
	4. Water balance. To identify groundwater bodies where abstractions exceed the available resource.	Good	High	Probably Not At Risk	Good Ecological Status by 2015		No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	Abstracted water returned to ground via SuDS where possible or to surface water.	Cut-off walls will locally influence flow in superficials.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	If required, dewatering will be temporary and localised. Abstracted water returned to ground via SuDS where possible or to surface water.	Localised/temporary or other minor effect	Remains Good Status	None required	Remains Good Status
	Quantitative Status	Good																				Good		Good

	Groundwater body					Scheme Elements	Embankment						Retaining Wall		Viaduct					Other Key Structures	Overall impact	Impact on Current (2009) WFD Element Status	Further WFD Mitigation (to retain or promote good status)	Residual Impact on Current (2009) WFD Element Status
							Streethay Embankment (CFA 22)	Pyford Brook East Embankment (CFA22)	Pyford Brook West Embankment (CFA22)	Ravenshaw Embankment (CFA22)	Shaw Lane Embankment (CFA22)	Lilac Embankment (CFA22)	Handsacre Retaining Wall		Pyford Brook Viaduct (CFA22)	Trent & Mersey Canal East Viaduct (CFA22)	Trent & Mersey Canal West Viaduct (CFA22)	Bourne Brook Viaduct (CFA22)	Harvey's Rough Viaduct	A515 Lichfield Road Underbridge				
							185-L1	188-L4	188-L5	188-L2	190-L2	191-L2	192-L4		188-L1	188-L3	188-L6	190-L1	191-L1	190-S2				
	GB40402G300300					Phase	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation		Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation	Construction & Operation				
	Staffordshire Trent Valley - Mercia Mudstone East & Coal Measures	Current status	Confidence	Risk	Status objective	Identified chemical impacts	None identified	None identified	None identified	None identified	None identified	None identified	Disturbing or mobilising existing poor quality groundwater by temporary dewatering/ permanent groundwater control	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	Creating or altering of pathways along which existing poor quality groundwater can migrate	"Damming" of groundwater flow and reduction in groundwater contributions				
WFD classification elements	**1. Saline or other intrusions.** To identify groundwater bodies where intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015	Predicted change to status elements (green = none, amber = possibly, red = likely)	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified as result of scheme element	No impacts identified	Remains Good Status	None required	Remains Good Status
	2. Surface water. To assess the impact of groundwater abstractions on the chemical and ecological status of surface water bodies.	Good	Low	Not At Risk	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Potential for impact to groundwater quality during construction. Potential hydraulic connection with Pyford Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Potential for impact to groundwater quality during construction. Canal unlikely to be in hydraulic connection with groundwater but site also near Pyford Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Potential for impact to groundwater quality during construction. Canal unlikely to be in hydraulic connection with groundwater but site also near Pyford Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Potential for impact to groundwater quality during construction. Potential hydraulic connection with Bourne Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Potential for impact to groundwater quality during construction. Potential hydraulic connection with Bourne Brook. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Localised/temporary or other minor effect	Remains Good Status	None required	Remains Good Status
	3. GWDTE's. To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTE's.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		Route crosses undesignated woodland with drains and a pool (southwest of East Hill Business Park, Fradley). Pool likely to be lost to the scheme so impact on groundwater body status not assessed. Potential GWDTEs in vicinity. Limited potential for impact to groundwater quality through unsaturated zone during construction. With the implementation of CoCP and best practice there should be sufficient mitigation in place to avoid adversely impacting groundwater quality. Negligible residual impact.	Route crosses Fradley Wood, Curborough Brook and associated habitats. Potential GWDTEs in vicinity. Limited potential for impact to groundwater quality through unsaturated zone during construction. With the implementation of CoCP and best practice there should be sufficient mitigation in place to avoid adversely impacting groundwater quality. Negligible residual impact.	Route crosses Fradley Wood, Curborough Brook and associated habitats. Potential GWDTEs in vicinity. Limited potential for impact to groundwater quality through unsaturated zone during construction. With the implementation of CoCP and best practice there should be sufficient mitigation in place to avoid adversely impacting groundwater quality. Negligible residual impact.	Route close to pond at Black Slough Wood and ponds at Wood End Lane. Ponds likely to be lost to the scheme so impact on groundwater body status not assessed. Route crosses Ravenshaw Wood, Black Slough and Slash, Tomhay Wood, Vicar's Coppice. Potential GWDTEs identified. Limited potential for impact to groundwater quality through unsaturated zone during construction. With the implementation of CoCP and best practice there should be sufficient mitigation in place to avoid adversely impacting groundwater quality. Negligible residual impact.	John's Gorse Ancient Woodland and BAP habitat including ponds and wet woodlands crossed by route. Potential GWDTEs identified. Limited potential for impact to groundwater quality through unsaturated zone during construction. With the implementation of CoCP and best practice there should be sufficient mitigation in place to avoid adversely impacting groundwater quality.	Near LWS wetland area off Tuppenhurst Lane. Potential GWDTEs identified. Limited potential for impact to groundwater quality through unsaturated zone during construction. With the implementation of CoCP and best practice there should be sufficient mitigation in place to avoid adversely impacting groundwater quality.	Near LWS wetland area off Tuppenhurst Lane. Potential GWDTEs identified. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Near LWS wetland area off Tuppenhurst Lane. Potential GWDTEs identified. CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	Close to Fradley Wood, Curborough Brook and associated habitats. Potential for impact to groundwater quality during construction. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Route crosses Fradley Wood, Curborough Brook and associated habitats. Canal habitats not considered groundwater dependent. Potential GWDTEs in vicinity. Potential for impact to groundwater quality during construction. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Route crosses Fradley Wood, Curborough Brook and associated habitats. Canal habitats not considered groundwater dependent. Potential for impact to groundwater quality during construction. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Close to John's Gorse Ancient Woodland and BAP Habitat, including ponds and wet woodland habitat. Vicar's Coppice Ancient Woodland nearby. Ponds that will be lost within construction footprint have not been assessed with respect to groundwater body status. Potential for impact to groundwater quality during construction. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Route close to pond near Shaw House. Pond likely to be lost to the scheme so impact on groundwater body status not assessed. Ancient Woodland nearby. CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	CoCP and best practice for design, construction and operations reduce risks to water quality. Negligible impact following mitigation.	Localised/temporary or other minor effect	Remains Good Status	None required	Remains Good Status
	4. Drinking Water Protected Areas (DrWPAs). To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.	Good	Low	Probably Not At Risk	Good Chemical Status by 2015		In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Within DrWPA. Abstractions in vicinity but scheme element is not within SPZ. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	Within DrWPA. Abstractions in vicinity but scheme element is not within SPZ. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	In DrWPA. CoCP and best practice for design, construction and operations reduce risks to groundwater quality. No significant impacts identified as result of scheme element	No impacts identified	Remains Good Status	None required	Remains Good Status
	5. General quality assessment. To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.	Good	Low	Varies by Parameter	Good Chemical Status by 2015		CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	CoCP and best practice for design, construction and operations reduce risks to water quality. No significant impacts identified as result of scheme element	No impacts identified	Remains Good Status	None required	Remains Good Status
	Chemical Status	Good																				Good		Good
	Overall status	Good																				Good		Good